

SCOTLAND'S STORY

1

**A land born
of fire and ice**

**Jurassic Skye:
Kingdom of
the dinosaurs**

**Meet our first
ancestors**

**Secrets of the
stone circles**

**Lipton: Grocer
to the world**




**BANK OF
SCOTLAND**

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TIMEBAND Part 1



3 billion BC

Scotland's oldest rocks, Lewisian gneisses formed. Scotland lies near the South Pole

410 million BC

The land masses of Scotland and England collide

250-205 million BC

Much of Scotland is flooded and then it moves near to the Equator and becomes largely desert. Dinosaurs roam Skye

65 million BC

Scotland splits from North America. Ailsa Craig, Skye and St. Kilda are active volcanoes

2.5 million BC

Onset of the Ice Age... Scotland is covered by ice about a mile thick which carves out its landscape

8000 BC

First hunter-gatherers enter Scotland

13000 BC

The massive glaciers start to melt, and a wet and rocky wilderness emerges

6000 BC

The land bridge to Europe floods, and Britain becomes an island

3100 BC

Skara Brae Neolithic village is established in Orkney

In Part 2:
Civilisations collide as the Celts encounter the legions of Rome



4 How the land was formed

The amazing story of how Scotland came to be blessed with such a variety of outstanding natural beauty.

Live-in stones For its size, Scotland has the most varied geology of any country on the planet. And those differing rocks affect our lives today.

Oceans apart Scotland and England were not even remotely connected.

James Hutton: first rock star The Scot who discovered that the world is older than 6,000 years.

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The first farmers burn the virgin forests to make way for their crops.

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22 Master builders

How our ancestors raised amazing monuments of enigmatic beauty.

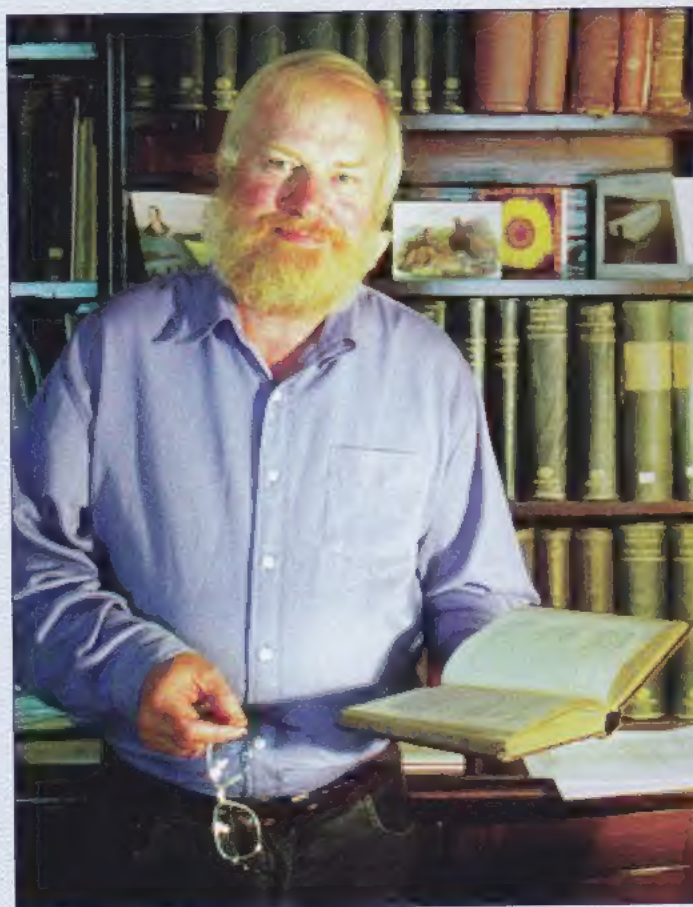
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Cover picture – Standing stones of Callanish.



Now it can be told...

Professor Edward J Cowan, Chair of Scottish History at Glasgow University, tells why it is time for a completely new look at the story of Scotland

Year after year, Scotland's historians are using new techniques to unlock fascinating facts about our past. These researches cover every era, from prehistory to times in living memory.

While this new vision has caused great excitement among historians and academics, it has largely been a secret they have kept to themselves.

Until now.

Scotland's Story presents our history born anew with the wisdom and insight of these exciting discoveries, often made by historians of the new generation. It offers readers genuinely close encounters with the past. And it does this at a crossroads in time, when Scotland's restored Parliament coincides with a new millennium.

Four centuries ago, the Scots historian George Buchanan wrote that the purpose of history was "to restore us to our ancestors and

our ancestors to us". Across ten millennia those ancestors, wherever they might have come from, have influenced our present, forging history long before Scotland had a name.

But we must examine the whole of our past. We cannot pretend that the last 300 years are more important than what went before, or that all aspects of our past reflect favourably on our national self-conceit. That is why it will take more than 1,500 pages for the story to unfold.

History is about the weighing and presentation of evidence, about confronting honestly those things which we might prefer to ignore or forget, and about frank scrutiny of those myths in which we wrap ourselves as a defence against reality.

So Scotland's Story is a new history for a new Scotland. We have the inestimable privilege of setting out with you on a journey without end.

HOW OUR LAND WAS BORN

Created in fire sculpted by ice

Scotland roamed the surface of Planet Earth, sampling the polar region and then the equator, before deciding that a temperate climate would suit us best



JUST as the Scots have an insatiable wanderlust that has seen us help to shape the modern globe, so too has the landmass we call Scotland. In a stramash of colliding continents and massive volcanoes it has roamed around Earth since the planet's creation four and a half billion years ago.

For much of that time, Scotland and England were on opposite sides of an ocean wider than the North Atlantic. And we are still on the move, drifting about seven or eight centimetres further from America each year. That's the rate at which your toenails grow.

The result of all this cataclysmic action is a country made up of an amazing variety of rocks sculpted by an Ice Age that has lasted two million years – and it is still going. For its size, Scotland has the most varied geology and natural landscape on the planet.

As the land drifted across the planet over millions of years, it carried a varied cargo of plants and animals, early forms of life that had to adapt to the ever-changing environmental conditions or die out.

Evidence of ocean depths, scorching desert and tropical rainforest are all to be found in the record of the rocks. It is those deserts we have to thank for the sandstone we have used for our buildings, and those tropical forests for the coal which warmed our homes and fuelled our Industrial

Revolution 350 million years later.

As Scotland's rocks were being formed, the landmass was part of a continent called Laurentia, which included North America.

Among the most ancient rocks in the world is the Lewisian gneiss (pronounced "nice"), which were created around three billion years ago in the bowels of the Earth and now form the Western Isles, Coll, Tiree, Iona and part of the North West Highlands.

Later, while Scotland was still part of Laurentia, powerful rivers flowed across the higher ground, dumping great thicknesses of sandstone on the primordial crust of gneiss, burying it yet again to a depth of more than a kilometre.

Above these Torridonian sandstones lies a layer of rock called the Durness Limestones, probably created from beach deposits marking the coastal fringe of Laurentia. The sands, silts and mud which went into making this layer contained much evidence of early life, for that time saw a profusion of new life forms across the world.

So the foundations for the Scottish Highlands were being laid. Thick sequences of sandstones, shales and limestones were later altered by heat and pressure in a massive collision of continental plates. These Dalradian and Moine rocks occupy much of the ground north of the Highland Boundary Fault, and the Dalradian rocks ►



600 MILLION YEARS AGO

A super-continent breaks up leading to the formation of the Iapetus Ocean. Scotland's oldest pieces become part of the North American continent, Laurentia.



500 MILLION YEARS AGO

The Iapetus Ocean begins to close generating volcanoes. The northern volcanic arc collides with Scotland to form the base of the Central Belt. The rest of Britain begins its journey north.



400 MILLION YEARS AGO

As the Iapetus finally closes the remaining pieces of Scotland come together, and the rest of Britain arrives to complete the picture.



40 MILLION YEARS AGO

The North Atlantic ocean opens and Scotland, until now a piece of North America, joins Europe. Africa and India have yet to collide with Europe and Asia.



Live-in stones



■ Glasgow



■ Edinburgh

A glance at any High Street gives an instant appreciation of the vast diversity of Scotland's geology.

Glasgow's tenements were built in the warm red and honey-coloured sandstones formed in the Permian period 250-290 million years ago and quarried at Mauchline in Ayrshire. Aberdeen's buildings are made of sterner stuff, the flinty granite formed some 440 million years ago. When building the elegant



■ Aberdeen



■ Elgin

avenues and crescents of the New Town, Edinburgh's masons relied on sandstone from Craigleith Quarry formed 340 million years ago. Elgin has a character all its own with its cathedral made of Triassic sandstone 205-250 million years old.

'Landmark' landforms like the Cuillins, the Cairngorms, Glen Roy and Glencoe were produced when the last Ice Age had its dramatic effect on an already varied geology 20,000 years ago.

► show evidence of some of the earliest life forms in the world – pellets thought to be dung produced by worm-like creatures.

One of the most amazing facts about our geological past is that up until around 410 million years ago Scotland was still a little piece of North America – the Laurentian continent – and was separated from England by the Iapetus Ocean. Over time, the seaway between the converging continents narrowed until they collided, and mountains were squeezed up in place of the vanished ocean. So two ancient continents were joined.

A mountain range, perhaps as high as the Himalayas, was created as a result of this continental collision. But as these great peaks were worn down by ice over millions of years, the granites and darker rocks known as gabbros were exposed.

The Cairngorms, Ben Nevis and many other landmarks throughout Scotland are carved from granite formed at this time. The altered rocks of Dalradian and Moine, mainly schists and quartzites, are also resistant to erosion and have remained as relatively high ground. And so, the Highlands were born.

After the storm of colliding continents came a period of calm. It was then that the red sandstones of Orkney and Caithness were formed in a huge freshwater lake as pebbles, sand and mud were deposited, layer upon layer.

Then began the age of the coal swamp, the Carboniferous, with



Scot who was the



Quite simply, James Hutton was the father of geology. In the 18th century he laid the basis of the science we know today, overturning a mass of theories about how the world began and how it developed. His findings were not universally accepted until after his death, but it was his brilliant, inquiring mind that led to a proper understanding of Planet Earth's beginnings.

Hutton, seen left in a detail from a portrait by Raeburn, was born in Edinburgh in 1726 and studied chemistry and medicine at the city's university, then began a career in farming, during

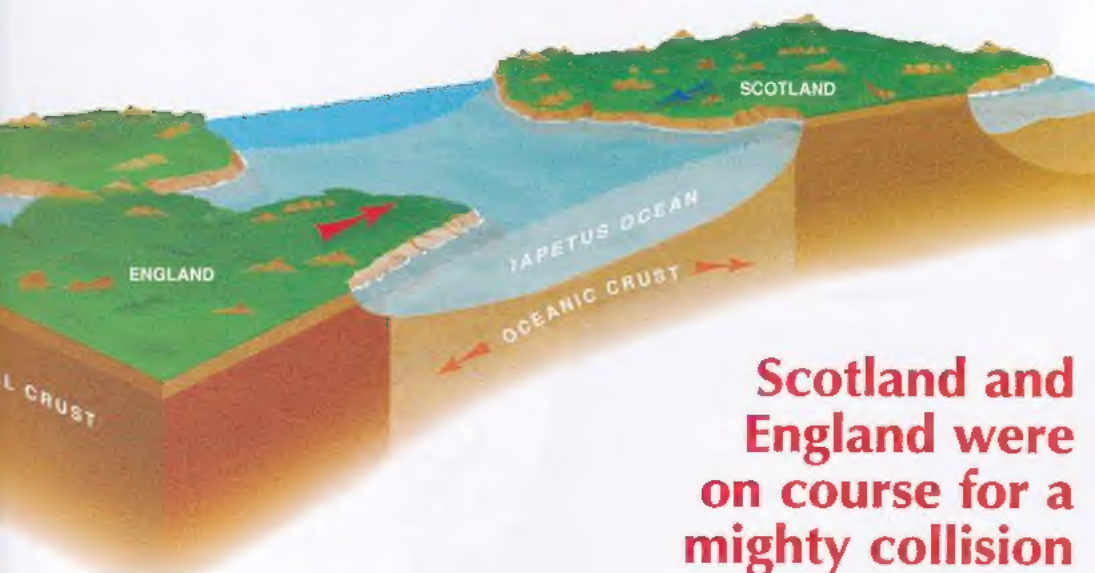
which he developed an interest in rocks. Until his researches, it was thought that the Earth was less than 6,000 years old.

This calculation was produced in 1658 by an Irish cleric, Archbishop Ussher, who had counted the generations as the number of "begats" recorded in the Bible. The precise date he came up with for the creation of the world was 4004 BC.

Hutton's researches, however, led him to the conclusion that the vast proportion of our rocks are composed of ancient formations laid down in long-disappeared oceans. He could see "no vestige of a



■ Rum, left, Bass Rock, middle, and Ailsa Craig are just three examples of many volcanoes which were active in Scotland for more than five million years and were eroded during the Ice Age.



Scotland and England were on course for a mighty collision

rainforests flourishing while Scotland edged its way over the Equator. The early part of this period saw vast outpourings of lava that spewed out across the Midland Valley to build the Campsie Fells and Gargunnock Hills. Edinburgh's Arthur's Seat and the Bass Rock volcanoes were also active.

Around them tropical swamps developed, and as dying trees fell into the swamp they formed layers rich in organic matter. Sediment built up on top, compressing these carbon-rich layers to form coal. During the next 70 million years,

the tropical swamps disappeared to be replaced by deserts as Scotland continued wandering northward.

Next came a flood of Biblical proportions as the sea level rose to cover much of Scotland. And when the water subsided, the land emerged to face yet another ordeal, this time by fire.

The land mass was still bound to the eastern flank of North America, but a new, major re-arrangement of the continents created the North Atlantic. The ocean we know today started as a tear in the Earth's crust, with

volcanic eruptions creating a central spine under the ocean.

Near the edges of this growing sea, molten rock broke through to form a line of volcanoes running from St Kilda to Ailsa Craig. Many individual volcanoes were active for about five million years, such as Arran, Ben More on Mull, Ardnarmurchan, Skye, Rum, St Kilda and Rockall.

Skye is perhaps the finest example of an ancient volcano which has had its inner plumbing laid bare by the elements. ●

TIMELINE

3 billion BC

(Precambrian period)

Lewisian gneisses, the oldest rocks in Scotland, are formed. Evidence suggests they are among the oldest in the world.

510-440 million BC

(Ordovician period)

The Iapetus Ocean, an ocean as wide as the Atlantic, divides Scotland and England.

440-360 million BC

(Silurian and Devonian periods)

Scotland is assembled out of four fragments of the Laurentian continent. As the Iapetus Ocean closes Scotland and England collide throwing up high mountains. Over the next 50 million years they erode forming sandstone deposits in freshwater lochs.

360-290 million BC

(Carboniferous period)

Scotland lies astride the equator. Rainforest covers the Central Belt and coral reefs flourish in tropical seas. Lava flows form the Campsie Fells. Arthur's Seat and the Bass Rock are active volcanoes.

290-205 million BC

(Permian and Triassic periods)

Desert conditions prevail and violent earthquakes rock the land.

205-65 million BC

(Jurassic and Cretaceous periods)

Sea levels rapidly rise. Most of Scotland lies under a tropical sea.

65-2.4 million BC

(Tertiary period)

Chain of volcanoes develops from Ailsa Craig to St Kilda, as the Atlantic Ocean forms and Scotland drifts away from North America.

world's first real rock star

beginning and no prospect of an end". And so our concept of geological time was developed.

For a spell, Hutton was farming in Berwickshire, and one important place in his researches was Siccar Point, on the Berwickshire coast. Here, wave action has revealed flat, sedimentary strata which was laid down on the seabed and now sits on top harder, folded rocks. It was the conclusion Hutton came to at Siccar Point which led to the publication in 1788 of his *Theory of the Earth*, which flew in the face of contemporary opinion.

This was largely divided between the

Vulcanologists, who believed all rocks derived from molten material, and the Neptunists, who thought all rocks were formed under water. Hutton's theory, though, was of a cycle in which weathering destroyed old rocks while new ones formed from their sediment. It was attacked from many sides, but he updated it seven years later.

The Siccar site, now known as Hutton's Unconformity, has been visited by geologists from all over the world. Other rock formations that helped support Hutton's theories were found on Salisbury Crags, part of Arthur's Seat in Edinburgh,

which have also become a mecca for scientists.

Accompanied by landscape artist John Clerk, Hutton embarked on field studies all over Scotland. His keen eye and Clerk's precise sketches produced some of the earliest geological records we have; and without his ideas it is hard to imagine how the theory of evolution could have been developed.

Hutton was one of the stars of the Scottish Enlightenment, but when he died in 1797, his ideas were still being dismissed by the academic establishment. To use the old Scots phrase: "Well, they ken noo!"

JURASSIC SKYE

The Scottish isle that was once the kingdom of mighty dinosaurs

Skye, Scotland's misty island, is a magnet for climbers and tourists alike. They are drawn by the craggy beauty of the Cuillins and the island's turbulent history. But it is also a 'must' destination for the palaeontologists whose discoveries unlock the secrets of time. For 205 million years ago, Skye was the Jurassic Park of Scotland long before

Hollywood ever dreamed up the idea of an island teeming with prehistoric creatures.

The fossilised remains of five different dinosaurs, ranging from the meat-eating ceratosaur to the two-ton plant eating stegosaurus have been found scattered over different parts of the island.

The earliest discovery, in 1982, was of a large, single footprint of a dinosaur similar to camptosaurus. However, it was not until 1994 that the first bones were brought to the attention of palaeontologists. The earliest is from about 205-million-year-old rocks and is a hind limb bone of a ceratosaur, a dinosaur similar to dilophosaurus. A German, Matthias Metz, found the bone in the south

Echoes from a tropical past

This fern leaf which grew in a tropical rainforest is a legacy of the days when Scotland was on the equator during the Carboniferous period, 360 to 290-million years ago. In the hot and humid climate, dense jungle covered the Central Belt. When its vegetation decayed, it laid down the coal that fuelled the industrial revolution.



Footprints in the sandstone near Elgin capture a moment in time when a mammal-like reptile passed over the desert sands of Moray in the Triassic period 250 million years ago. Scotland lay off the east coast of Pangea, a giant super-continent, with a sub-Saharan climate. Fossils similar to this can be seen on a popular footpath at Hopeman, north of Elgin.





Even small fossils like these ammonites help us to understand how life developed in Scotland.

of the Isle of Skye in 1992, and later donated it to the National Museums of Scotland.

In 1994, a 165-million-year-old piece of bone, from the Middle Jurassic, was discovered in northern Skye by oil exploration geologist Dr Doug Boyd. At about the same time, another piece of bone was found near Staffin by local collectors Jan Wolfe and Chris Mitchell. When the pieces were placed together, it was found they were from the same bone. However, there was a piece missing from the middle.

Chisel marks on the sandstone block in which the bone was found indicated that yet another person had collected the middle section. After an appeal, it turned up anonymously in the post and is now reunited with the rest of the bone on the Isle of Skye. It turns out it was a leg bone of a cetiosaur, a large plant-eating dinosaur.

In 1995, a large tail bone with strange grooves on its underside – which suggested that it belonged to the meat-eating ceratosaur dinosaurs – was found by local collector David Morgan. But after extensive research and comparison with similar bones in the United States and England, it was identified as another bone of a plant-eating cetiosaur.

A rib bone from a similar dinosaur was also discovered on a beach in northern Skye, and had to be removed by helicopter due to its size and weight. That same year, came the first finding on Skye of a

fossilised bone confirmed to be from a meat-eating dinosaur. It was a small tail bone of a creature related to coelophysis, which is known only from the Late Triassic of North America. A year later, the footprints of a small dinosaur were found near Staffin. The size of the prints indicate they could have been made by this small meat-eater.

In 1997, a tooth-shaped bone found in Staffin was established as part of a stegosaur-like dinosaur, the earliest of its type in the world.

Why Skye?

The fossil remains of large dinosaurs have been found nowhere else in Scotland. Did these huge animals simply like it there? Well, of course not, and the answer is simple.

Only on Skye, a few other Western Isles, and on the East Coast around Golspie, have rocks which were formed in the Jurassic period become exposed through erosion. Generally, these have given up fossil bones of marine reptiles similar to crocodiles.

The Jurassic rocks on Skye are exceptional, because they have been exposed as a cliff face. As erosion continues, and slabs of rock fall away from the cliff, they reveal secrets from around 200 million years ago – like slices through time itself.

Although no other dinosaur remains have been found, other parts of Scotland are rich in fossil

TIMELINE

550-510 million BC

Durness limestone preserves worm burrows, the earliest traces of life in Scotland.

333 million BC

The famous Bearsden Shark meets its end.



205 million BC

Dinosaurs like ceratosaurs and coelophysis, above, roam Late Triassic Skye

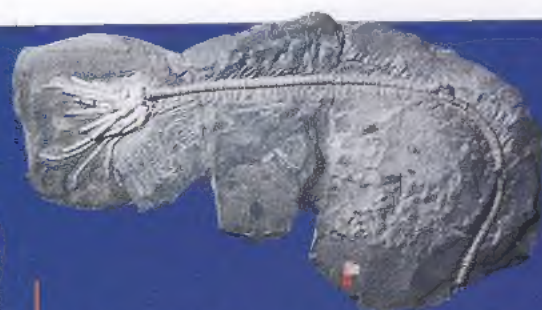
175 million BC

Jurassic stegosaurs, below, browse Skye's plant life.



170 million BC

Plesiosaurs swim off Eigg.



A Crinoid or Sea Lily from Scotland's Jurassic period, when there was a rapid rise in sea levels and coral reefs around our coasts teemed with life. The period, 135-205 million years, ago bequeathed fossil hunters a rich collection of treasures like this crinoid and many fine examples of ammonites.

A spectacular display

of 340-million-year old tree trunks can be seen in Glasgow's Victoria Park. Discovered in the 1880s, they came from a Carboniferous rainforest that covered Glasgow when it lay on the equator.





■ The plant-eating camptosaur, similar to these iguanodons, once roamed Scotland and left its footprint on the rocks of Skye, to be discovered in 1982.

► remains from past lives spanning many hundreds of millions of years and many regions of the globe. That's due to parts of Scotland's land mass coming together from all over the globe 380 million years ago. Scotland's journey across the world brought it through different climatic zones which are recorded in the rocks as clearly as in the pages of an encyclopedia.

The fossils held by the rocks, when interpreted by the palaeontologists, give an understanding of Scotland's travel through time. From microscopic bacteria, to trilobites (crab-like creatures), shells and fish to dinosaurs, all are important in helping us understand the development of life in Scotland. A

brief look at some of the key Scottish fossils that have changed our views on prehistoric life gives an indication of how dramatic climate changes affected different life forms.

Many spectacular fossil trilobites found near Girvan were swept to their deaths by huge submarine mud-slides. During the Silurian Period, about 420 million years ago, the first land animals, the millipedes, crawled on to land at Stonehaven. Elsewhere, close to Lesmahagow, the shallow seas and lagoons were filled with large, metre-long shrimps and sea-scorpions, as well as primitive jawless fish. Although these are not the earliest fossil fish, they are certainly the most complete and beautifully preserved examples.

It is from the later Devonian Period, with its arid deserts and ephemeral lakes, that land plants with insects and mites are found spectacularly preserved in a hot spring deposit at Rhynie, near Aberdeen. The springs at Rhynie were similar to those found at Yellowstone Park in North America today, where plants and animals are encrusted with lime or silica. Almost as if they were still alive, the fossils are found petrified in a glassy, silica rock exactly where they died some 400 million years ago.

Dried-up pools of water filled with the dead remains of fish at Dura Den, near St Andrews, provide us with evidence of the desert conditions Scotland was then experiencing. At that

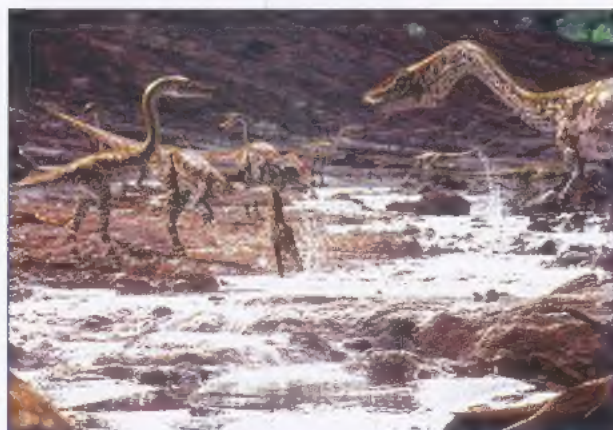
time, near Elgin, one of the earliest tetrapods (four-footed animals) may have taken its first steps on land. Named *elginerpeton*, it had a tail for swimming as well as feet with toes with which it may have pushed its way across short stretches of land.

Scotland has some of the most spectacularly-preserved fish, sharks, shrimps, and primitive tetrapods.

The Bearsden Shark found by Stan Wood in 1982 is well known to Glaswegians. It is the world's most perfectly preserved shark of its kind from the Carboniferous period about 330 million years ago. The strangeness of the toothed structure behind the head has led to speculation about its use. Some say it is a rudder, or an attachment to hitch a lift from a giant passing fish, or a sexual tool used in attracting or stimulating a mate. People will always speculate, whatever the real reason for the structure.

Unusually, fossil shrimps found at the same site in Bearsden have such a high level of preservation that blood vessels and muscles can be seen. This is a very special discovery, because in most fossils it is only the hard, shelly or bony structures that remain when the soft tissues have rotted away.

From a site near Bathgate, Lizzie the Lizard (*Westlothiana lizziae*), has been hailed as the world's earliest reptile. Although this is not strictly true, for it shows characteristics of both amphibians and reptiles, it is certainly an important link in the early evolution of both types. Other primitive tetrapods were found in rocks that were produced from hot springs during the Carboniferous period at



■ The fossilised tail bone of a dinosaur relating to *coelophysis*, above, was discovered in Skye in 1995.

Bathgate, and these are closer to amphibians than to reptiles. What these animals show is the earliest evidence of how the evolutionary lineages of reptiles and amphibians split apart.

What is probably the most important fossil discovery in Scotland was made by Dr Euan Clarkson of Edinburgh University. While looking through the fossil collections of the Geological Survey, he noticed a white, worm-like fossil, about four centimetres long, on a black rock.

On closer examination he could see small teeth in the animal's head. Geologists had long known about teeth like those, and for more than a century used them in fixing the date of rocks. The teeth are important as they evolved and changed throughout geological time, and are very common from the Cambrian (about 520 million years ago) until the Triassic (about 220 million years ago), making them a crucial dating tool. Previously, nobody had seen the animal from which the teeth came.

Thousands of scientific papers, many books, as well as a few songs, had been written about the teeth but, for the first time, palaeontologists really had something to sing about. It was not long before several more of these animals were found in rocks near Edinburgh. It was amazing that such a small, unimportant-looking fossil turned out to be the find of the century.

During the building of the Museum of Scotland extension in Edinburgh, a quarry was re-opened in Hopeman, north of Elgin, to produce facing stone. A local geology student, Carol Hopkins, found that the quarrying operation had revealed a vast number of sandstone blocks covered in the tracks of these animals. Many of these are now in the collections of the National Museums of Scotland in Edinburgh.

The stone-cutters who worked the quarry helped to provide a display area near a popular path for walkers, so that visitors could see these footprints from another time.

As Scotland moved further north into climates more akin to that of the Mediterranean, the fauna changed yet again. In the south of the Isle of Skye small, primitive mammals have been found in the 170-million-year-old Jurassic rocks, along with small reptiles which include crocodiles.

In the 1850s, the Scots geologist Hugh Miller wrote of his discovery of Jurassic reptiles on the Isle of Elgg. In his book *The Cruise of the Betsey* The bones of ichthyosaurs, crocodiles and plesiosaurs were found there, but unfortunately he was not able to find any dinosaur bones.

Every year, collectors come to Scotland because they can expect to find rare and well-preserved fossils. It is about time we protected our fossils for future generations to study and enjoy, for we are losing more and more of our prehistoric heritage every year. There is an important fossil lying somewhere in Scotland, waiting for someone like you to pick up and take to a museum. Such finds donated to a museum by a member of the public will be made available for research and will always have the name of the donor associated with it.

The palaeontological paradise which is Scotland has revealed many of its treasures and will continue to reveal them to us for many years to come ●

Do you live with a stegosaurus?



Someone, somewhere is living with a bone from a Scottish dinosaur... probably tucked away in a drawer or gathering dust on a shelf. Fossil experts certainly hope so... and they hope the owner will read this and contact their local museum.

The bone was discovered in 1997 south of Staffin on Skye and it came from rocks 175 million years old. The find was made by Colin Aitken of Edinburgh, while on holiday with his family. The bone was preserved as a 30cm-long dark coloured shaft in a light-coloured rock.

Aitken hid the rock in a nearby ruined cottage to be retrieved later. But when Dugald Ross of the Staffin Museum went to collect the fossil, he found that the

rock had been smashed and the bone removed. Luckily, the collector had not spotted another tooth-shaped bone still partially covered in the rock.

This turned out to be one of the most interesting dinosaur discoveries made on the Isle of Skye. It was part of the forelimb of a plesiosaur (stegosaurs and ankylosaurs) and the earliest of its kind in the world. It is sad to reflect that what is without doubt part of the world's earliest known stegosaurus-like dinosaur was removed from the ruined cottage. It may have been useful in



Dugald Ross hopes someone will soon return the missing dinosaur bone which was taken from the hidden rock.

identifying the animal more precisely, but unless the collector returns the bone, we have no way of knowing.



These Cairngorms glaciers were last seen around 10,000 years ago. Scotland during the last Ice Age was a very different place from today's landscape. Photo: © Peter G. Turner

An all-embracing sheet of ice 20 times the height of the Wallace Monument gripped Scotland 20,000 years ago, a mere instant in geological time. And we see traces of the Ice Age everywhere – hills and glens, corries and sea lochs, our coastal scenery, even the soil in our gardens.

The Ice Age pendulum swung back and forth, and during the warmer periods the climate was more like today's. Indeed, we are in the Ice Age.

A deep freeze covered Scotland probably five or six times during the last 100,000 years, and the geological pendulum is due to swing us back under an ice sheet.

But don't be too concerned. The Highlands may see glaciers in a few thousand years, but total coverage is probably 50,000 years away, and global warming may delay its arrival.

During the last glacial period, a vast sheet perhaps 1,400 metres deep buried the landscape, and only a few mountains in the North West poked through it.

In warmer periods, smaller

forms of the Cullin, Rum and Arran hills.

Glaciers smothered the Lowlands in a blanket of till or boulder clay. In the Tweed Valley and Solway areas, the clay was moulded to form low hills, or drumlins. Glasgow is built on an expanse of drumlins.

Vast volumes of meltwaters cut channels in the bedrock to form dry valleys on the northern flanks of the Moorfoot Hills and Lammermuirs and on the northern slopes of the Cairngorms.

On lower ground, meltwaters deposited sand and gravel to form mounds, ridges and terraces, notably around Inverness, in

between Lanark and Edinburgh. By around

2,000 BC, almost all the last ice sheet had melted. But then the Gulf Stream shut down, and glaciers once more expanded in the Highlands, producing moraines – the heaps of debris we see in glens and on Rannoch Moor.

The final cold snap ended abruptly about 9,500 BC, when the climate entered its present interglacial mode.

The advance and retreat of the ice sheets affected the levels of land and sea. The weight of spreading ice pressed the land down, only for it to rise as the ice retreated. These changes produced the magnificent raised beaches seen on Islay and Jura, and along the East

As the underlying rocks adjusted to the weight of the great ice masses, the areas between and around Scotland and Scandinavia bulged up. During the later part of the glacial period, the North Sea bed was dry land covered by tundra. Mainland Europe stretched to the Shetland hills and the eastern Scottish rivers drained through the tundra to a deep, narrow inlet off the coast of Norway.

The ice melted gradually leaving ridges and humps of gravel and sand over the Scottish landscape, and the oceans started to fill.

By 12,000 BC the rise in global temperatures had melted the massive ice sheets which covered Scotland.

With the huge weight of ice gone, Scotland rose and in compensation the North Sea lands slowly sank. Reindeer, and possibly wild horses and giant deer roamed a shrinking continent into the peninsula of northern Scotland.

Then temperatures fell again, and the built-up ice walls in the western mountains. The glaciers did not finally disappear until about 9,500 BC when temperatures rose above those of today.

Ice cold in Alexandria and everywhere else...



Norwegian Trench

CARDIFF

Ouse

BRUSSELS

BONN

RENNES

PARIS

12,000 BC

Present day

Ice sheet
coverage at
10,000 BC

Loire

Our family tree takes root

As the ice melted, Scotland heaved itself out of the spreading seas and a wild and wooded landscape was formed. A landscape stalked by wolf, lynx, bear and that other predator... the hunter-gatherer who was our ancestor

Our earliest ancestors walked here over a huge land bridge which linked this country to Europe. They arrived in a Scotland of thin soils, grasses, bushes, birches and a rich supply of animals for food. Hunters, some who had journeyed from Mediterranean lands, stalked red deer, elk, wild cattle and pigs.

They fished in rivers running rich with salmon, and enjoyed trout from lochs. Grey seal, dolphin, cod, saithe, eel, seabirds and shellfish made good eating and they gathered roots, fruit and nuts.

But they did not have Scotland to themselves, for the first people faced a hostile environment and were in competition for food with wolf and brown bear.

At the time, the English Channel was a vast inlet, southern Britain was linked to the Rhinelands, and Britain's coastline extended far out into the Atlantic, although Ireland was separate from Britain. The Western Isles and Shetland were probably a large single island.

The earliest evidence of hunter-gatherers in Scotland dates to 8,000 BC, although people were probably here before then.

Survival was tough, but hunters and their families existed with the aid of primitive tools and weapons made from organic materials such as bone, antler, wood and leather. Barbed harpoons were their main weapons, and testimony to their lifestyle can be found in bone tools which survive in caves.

These Mesolithic hunter-gatherers lived in small groups, and evidence of their activities comes from a few settlement sites and scatters of tiny flints called microliths which were set into the edges of wooden tools and hunting weapons.

It is possible the abundance of hazel around 8000 BC was encouraged by hunter-gatherers, who probably coppiced and burnt the bushes to increase nut production. The nuts were roasted in pits, presumably to improve their keeping qualities. But few sites have been dated, and although there is one radiocarbon date of around 8000 BC from a pit in a hunter-gatherer camp by the Daer Reservoir, near Biggar, the other earliest-known sites are

from around 7,500 BC. One was a briefly occupied hazel processing shelter near Fife Ness and the other a (probably seasonal) settlement at Kintloch, on Rùm.

Elms began to colonise the South of Scotland around 8000 BC, and some 500 years later oak trees started to flourish there. About the same time, pine had spread over from Ireland into south west Scotland and had become abundant in the north west Highlands.

The people lived in a constantly changing environment, as the grass and bushes were slowly replaced by woodland, spreading two or three kilometres northward every human generation. It took about 2,500 years for the oaks to spread as far north as Skye and Aberdeenshire.

The people were hunters, and they hunted with domestic dogs. Remains of red deer, elk, wild cattle and pigs have been discovered from this period. There were no sheep, and no rabbits.

The tiny settlements were very similar throughout Scotland, probably because living in small groups they married out of their own group, which gave them constant contacts with others. Perhaps also they exchanged raw materials like flint, Rùm bloodstone and Arran pitchstone, and shared food in lean times.

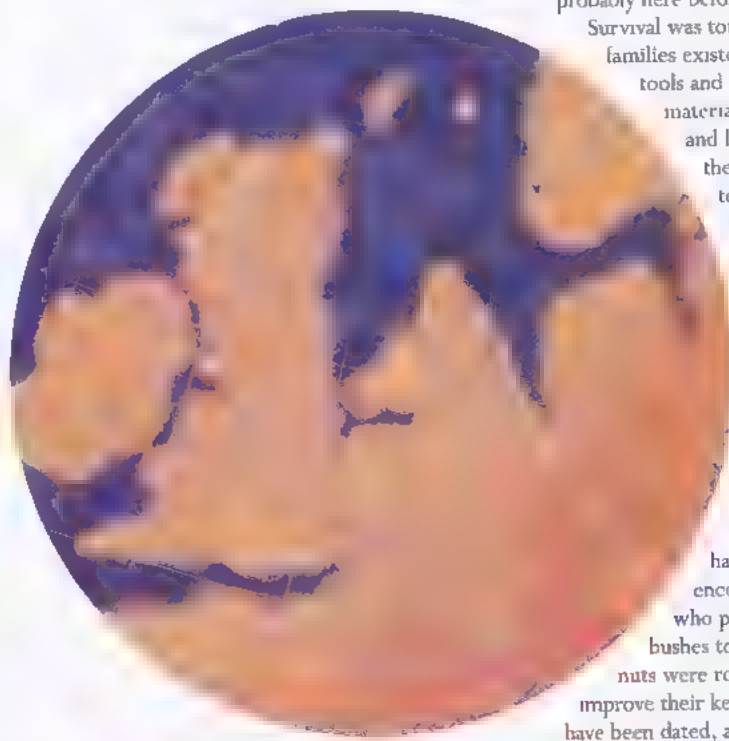
Around 6,000 BC, the last land link with the Continent, somewhere in East Anglia, was submerged – and Britain had become an island.

One of the big changes in comparison with today is that there were so few people. By today's perspectives, probably only ten to 20 people for every 1,000 square kilometres of deciduous woodland. However, in some favoured areas, populations grew more dense.

In a recent project, called Scotland's First Settlers and based in southern Skye, around the Sound of Raasay, local people and professional archaeologists working together have located numerous previously unknown shell-middens. The abundance of the sea and the natural produce of the land in this area could have supported larger communities.

On the parts of the Continent facing Scotland, barley and wheat were grown before 5,000 BC, but there are no definite signs of cereal-growing here until around 4,000 BC.

But experts point to pollen of a kind produced by both cereals and wild grasses in natural deposits dating to before 4,500 BC, and suggest that hunter-gatherers may have been cultivating



■ The land bridge our forebears crossed on their way north. By 6,000 BC, Britain had become an island.





TIMELINE

13,500 BC

The beginning of the end of the Ice Age as the ice sheet covering Northern Europe begins to melt. Starting in the South, the landscape emerges. At this time, Britain is attached to Europe by a wide land bridge across the North Sea.

9,500 BC

End of the last Ice Age

9,000 BC

Grasses, mosses and trees such as oak, hazel, elm, pine and birch take root in Scotland.

8,000 BC

A hunter-gatherer camp near Biggar provides us with our earliest date for people in Scotland. Most evidence of these forebears, like the shells pictured below, has been found along the coastline. They had a nomadic life, gathering shellfish, and hunting animals like reindeer and wild oxen. They used arrows tipped with flint, like the one pictured above.



6,000 BC

The melting ice raises the level of the seas so that Britain is now cut off from Europe.

4,000 BC

End of the Mesolithic period. Settlers start to clear the forests and farm the land.

small patches. Archaeologists think people in favoured areas like the Forth Valley may have started to lead a more settled existence, and they may even have planted grain which they had exchanged with distant farmers for raw materials, foodstuffs or marriage partners.

This period marks a real change for Scotland. Although people had been managing the landscape during the preceding 4,000 years, they probably had hardly more effect on the great forests than browsing cattle or lightning fires. So 4,000 BC, give or take a few centuries, is the last time the whole of Scotland was covered by semi natural vegetation.

South of a line running roughly from Stonehaven in the east to Lochgilphead in the west, the land was mostly covered by a mixed oak, elm and hazel forest, with birch replacing the

oak on the highest hills and in Kintyre and the Inner Hebrides. Alder and willow grew along the watercourses and there were probably many clearings.

North of that line, birch, hazel and oak woods prospered along the southern flanks of the Grampians in Aberdeenshire, and along the coasts of the Moray Firth as far north as Helmsdale. A similar forest covered Morvern, Skye and Applecross. Between these coastal woodlands, pine and birch ruled as far north as Helmsdale in the east and Assynt in the west.

Only the high mountains in the North West were clear of woodland, as they remain today, and on them remnants of the ancient tundra plants survived, living witness of the plants which had covered the North Sea plain during the great glacial period.

Watch out for that scraper

Were the Mesolithic hunter-gatherers really the first people in Scotland? There is some evidence pointing to an earlier date.

Our ancestors *homo sapiens*, the first truly modern people, established themselves in Britain 30,000 years ago in the Palaeolithic period. If any of them walked Scotland's soil, the last Ice Age is thought to have wiped all evidence of them from the face of the land. But did it?

Two flint axes, one found at Hillhead, Glasgow, and now in Inverness Museum, and another at Islay Museum, may be Palaeolithic, but there is no good evidence to show where they originated. And archaeologists still argue over Reindeer

Cave at Inchnadamph in Sutherland. It produced 900 reindeer antlers aged from 22,000 to 44,000 years.

There is probably a natural explanation, but it does show that reindeer, the main food source for hunter-gatherers, roamed Scotland during a warmer spell.

Most intriguing of all is the flint scraper found 90 miles north east of Shetland in the North Sea. It came from a sea-bed core 473ft down. The North Sea was dry land 18,000 years ago but the scraper may have come from a later, Mesolithic shipwreck.

So when digging the garden, or walking the dog, keep an eye open for that elusive flint scraper which could add 20 millennia to our history.

Flames of progress

The first farmers burned the virgin forests to make space for their crops and animals. And civilisation dawned

It's hard to believe in these times of widespread countryside unrest, but Scotland's first farmers saw seeking pastures new as the way ahead. True, they had to clear the forests that covered the southern half of the country, but when that back-breaking work was done, there was ample leisure time for more pleasurable pursuits – huntin', rootin' and fishin'.

Farmers spread into the mixed oak, elm and hazel forests of the southern half of Scotland from England, Ireland and the Continent, around 4,000 BC. Somewhat earlier, though, Scottish hunter-gatherers may have adopted cereal growing and the raising of sheep, cattle and pigs to enrich their traditional ways of life.

Since the numbers of both the hunters and the incoming farmers were small, they probably had to marry into each other's communities if they were to find suitable partners.

The climate was slightly warmer and wetter than it is today. The farmers' tools were made of stone, wood and bone, and it would have been easier for them to burn a patch of forest for planting their crops than to try to cultivate grasslands.

In a freshly burned area of forest, cultivation by hand was effective. Cereals could be planted in the ashes using hoes, and weeds were not much of a problem. Grassland cultivation required draught animals for ploughing. They needed to be cared for, and half the cultivated area would be required just to feed them. The fields would have to be weeded.

All in all, woodland farming allowed much more leisure and gave more time for the relatively pleasant tasks of

hunting and gathering. Family groups probably cleared a new patch of woodland every two or three years. After about a generation their local area would have been a mosaic of clearings and woodland at various stages of growth, supporting a great variety of resources. Deer would have been attracted to recently abandoned spaces with rich grass and herb cover, and slightly older clearings would have had hazels, fruit bushes and good browsing for wild cattle.

Some areas would be coppiced to provide long, straight wood for buildings, enclosures and tools. Over about one human generation, the canopy of the trees in the oldest clearing would have closed, shading out weeds and bushes, and it would be easier to burn that patch again for cultivation than to seek out a fresh part of the virgin forest.

The cycle of clearance and tree growth would have taken place in an area of maybe 10 to 20 hectares, depending on how spaced out the clearings were.

Farming in this way was a great success, and the population grew. New areas of forest were taken in. Present evidence suggests that, very roughly, only 20 to 25 generations passed before farming became the dominant way of life in the extreme north of Scotland.

This was a remarkable rate of expansion for people who had to carry everything from the south on the backs of lumbering oxen or in log boats and coracles – especially if farming started only in southern Scotland.

But it may have started in several areas. One of the most remarkable of recent discoveries is a great timber hall at Balbradie, on Deeside, dating from between 3,800 BC and 3,600 BC. It is like houses of that era in north west France, and like nothing earlier in Scotland.

The charred remains of wheat and barley and associated weeds of cultivation, as well as crab apple and flax seeds found there, suggest a Continental farming pattern.

Other timber halls are known through air photography, from Lothian to Aberdeenshire.

So perhaps several groups of people settled along the east coast directly from the Continent. The hall was built on the

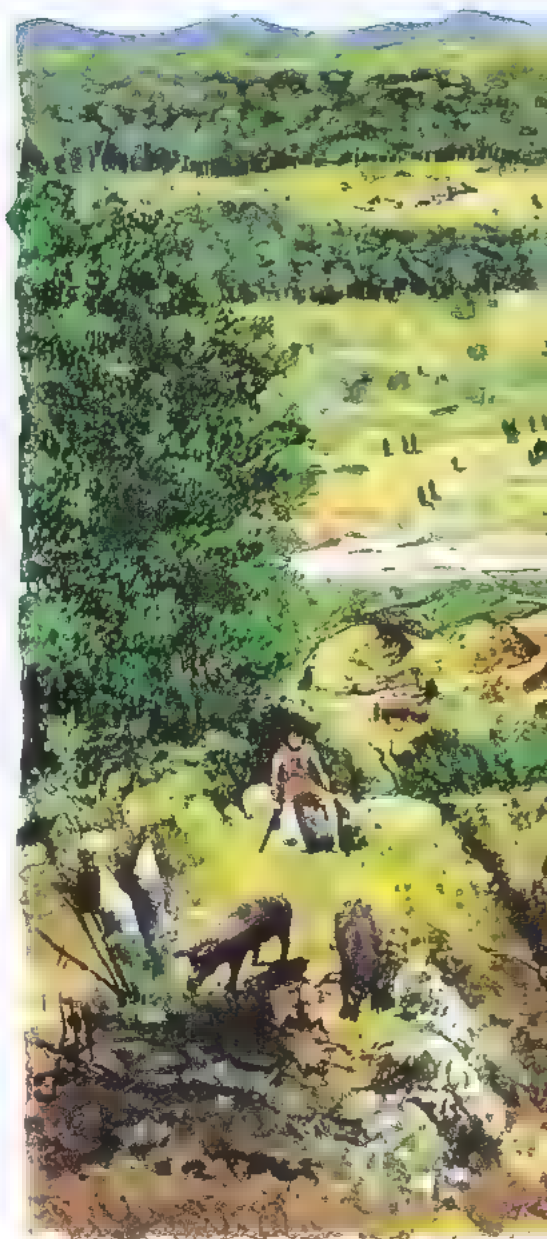


Illustration DAVID SIMON

river terrace on the south side of the River Dee. Its floor area was greater than 300 sq metres, three or four times that of many modern houses.

It could have served any of several purposes. Perhaps an extended family of farmers lived there. Or perhaps it was used for food storage and for feasting by a community which lived in smaller houses along the valley. Or conceivably it was a temple, or a place in which the bones of the ancestors were stored – a house of the dead.

No bones survived in the acid gravel of the river terrace, and evidence to round out our ideas of how the people lived will only be obtained when a similar hall in a more lime-rich area is excavated.

The most famous early house, Knap of Howar on Orkney, is 250 to 500 years later in date. It is particularly important because of the evidence from the rubbish tips around it. The people used big, plain, baggy pots and graceful, highly decorated round-bottomed bowls (quite like



■ Before metal came into use, farmers had to rely on simple wooden and bone tools.



■ Another day of work down on the Neolithic farm. In the background are ritual buildings and tombs.

those found at Balbridie). They used stone drills, knives, pounders and abraders, and bone awls, spatulas and maces. They ate barley and beef, pork and mutton, venison, fish and shellfish, as well as seals, whales and sea birds and doubtless also berries and other plants.

Their mixed economy was probably the key to long term survival. If one source of food failed there was always another to hand.

The very small number of houses known in Britain has led some to argue that people did not

■ Some northern communities may have reached Scotland directly from Europe

live in settlements but led a nomadic existence. That may not be true in Scotland.

In general, houses seem to have been straight-sided and round-cornered, and it is very difficult to think how they could be distinguished from much more recent ruins merely by looking at them.

For instance, the 3,500 BC date of a settlement at Ardnadam, in Cowal, with houses four to five

metres across built of light timbers on a turf and stone wall base, could not have been determined without excavation.

The remains of burial places, earthen and stone long barrows and chambered tombs, are often much more readily identifiable. The different types of tomb found in different parts of Scotland have long demonstrated that there were regional differences within broad common traditions. But evidence from air photography and programmes of field survey have shown that there is an even greater variability hidden in the plough lands and lowland pastures.

Many timber and earthwork settings, long avenues and related monuments, have been discovered. One of the most intriguing is a timber enclosure at Douglassmuir, near Frioekheim, in Angus. It was laid out like a domino, with a gate at one end and another in the central divider.

Different again are two ditched enclosures a few hundred metres long and 30-40 metres wide at Holywood, near Dumfries, which form

TIMELINE

4,000 BC

Beginning of the New Stone Age, or Neolithic period, as settlers start to farm the land, tending livestock, planting grain and clearing forests, using stone axes, right.



4,000-3,000 BC

Large timber monuments, sometimes two kilometres long, like Holywood and Cleavendyke are constructed.

3,800-3,600 BC

The great timber hall at Balbridie on Deeside is built. Crop analysis from Balbridie shows European connections.

3,750 BC

First chambered tombs in use. Gradually they develop into spectacular structures such as Maes Howe and Quoyness on Orkney, below.



3,500 BC

The farmsteads at Knap of Howar on Papa Westray in Orkney are built.

2,000 BC

The first metalwork in Scotland. And the end of the Neolithic period.

We are on the verge of an explosion of knowledge of how the earliest settlers farmed their land

► part of a complex of sites including a stone circle, the Twelve Apostles, and traces of ring ditches and other sites

We do not know what these monuments were used for, although there are many ideas. The most popular speculations are that these long monuments controlled movement in the local area, or that they created a microcosm of the world known to their builders. Those laid out in relation to earlier monuments may have linked people to their ancestors.

Some other ideas seem to be contradicted by the evidence – for instance, they do not seem to be aligned with the rising, or setting, of the Sun or Moon at the summer or winter solstice.

In Fife, at Balfarg Riding School, near Glenrothes, other aspects of early beliefs have been explored through excavation. Two house-shaped enclosures have been discovered, in which the bodies of dead people were exposed on platforms.

Along with these, and another circular enclosure built later, is a complex of monuments, including a great near-circular earthwork.

From around the time farming started in Scotland, circular burial mounds and enclosures had been used for housing the dead, but the large earthwork at Balfarg is of a kind which first became popular in some, but not all, parts of Scotland around 3,000 BC.

Similar enclosures are found as far north as Orkney, where the Stones of Stenness and the Ring of Brodgar are icons of the Scottish past.

Other recent excavations have added yet more to our understanding of the Neolithic peoples of

Scotland. At Dunragit, near Stranraer, air photography and excavation have revealed an enclosure consisting of a huge double-ring of timbers, inside an even larger ring.

It also showed rows and rings of posts overlapping the enclosure. Here it seems that an area was used for construction of a succession of short-lived monuments.

Superficially similar to another large timber enclosure at Meldrum Bridge, near Peebles, it is perhaps only its construction method which produces that impression. Meldrum Bridge was built at a time when metal tools and weapons were just being introduced into Scotland, but Dunragit has yet to be dated.

We are on the edge of an explosion of new understanding. Remarkable things are being discovered yearly.

In addition to the timber enclosure at Dunragit, a timber platform, preserved by water-logging and dating to around 3,500 BC, has been discovered on the edge of Flanders Moss, not far from Kippen, in Strathclyde.

Excavations have revealed field systems and other structures beneath blanket peat near the great stone ring and alignments at Callanish, in the Western Isles. Two new settlements have been discovered

in Orkney. Publication of older excavations, after years of painstaking analysis, show that Neolithic landscapes survive under the Scottish peat-lands, for instance in Arran.

One thing is certain among all this change. The textbooks will have to be rewritten sooner rather than later.



Wood yew believe a bow from 4,000 BC?

It was a fine summer's afternoon in 1990 when distinguished Borders psychiatrist Dr Dan Jones spotted something glinting near the bottom of a peat hag, way up on a remote upland plateau called Rotten Bottom near Moffat.

Being a collector of oddly-shaped bits of wood, he strapped it to his rucksack and proceeded down the steep valley with his dog Sally. Little did he realise that he had made a one-in-a-million discovery – a 6,000-year-old bow, the oldest in Britain and Ireland.

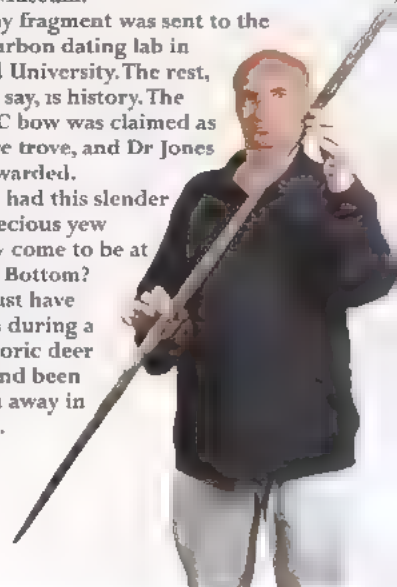
The world would not have known about it but for another stroke of luck.

The next summer, hill-walking near his home, Dan met Borders archaeologist John Dent, excavating an Iron Age hill fort. John recognised the stick as a bow, and arranged for it to be taken to the Royal Museum.

A tiny fragment was sent to the radiocarbon dating lab in Oxford University. The rest, as they say, is history. The 4,000 BC bow was claimed as treasure trove, and Dr Jones was rewarded.

How had this slender and precious yew flatbow come to be at Rotten Bottom?

It must have been broken during a prehistoric deer hunt, and been thrown away in disgust.



Riddle of the rings

At Balnakeil, in Argyll's Kilmartin Glen, these circles and hollows – known as cup and ring markings – have been pecked out of the rock with a stone hammer. The crude artwork portrayed simple animal figures.

The 5,000-year-old decorated rocks are found in upland areas, around basins of



upland pastures. It seems a number of different hands have worked, or re-worked, these surfaces.

One theory is that the markings were made by different people who visited at different times. Like a visitor's book.

We may never fully understand the significance of these sites. But it is certain that the places where they are found are of great importance.

► Balnakeil is one of more than 100 sites looked after by Historic Scotland.

► More information on 0131 668 8600, or

► Log on at www.historic-scotland.gov.uk



■ The village lay-out at Skara Brae, with its low passages like underground lanes, suggests it was a close community.

Secret of the sands

From the mists of time a village emerged to show how well our ancestors lived 5,000 years ago

A violent storm in the winter of 1850 blasted Skail Bay in Orkney's western Mainland, sweeping away the sand dunes and revealing one of the world's most remarkable archeological discoveries – a village built half a millennium before the Great Pyramid of Cheops in Egypt, with cosy linked homes featuring Flintstone-style furniture, box beds and indoor toilets.

The Skara Brae settlement is the finest and best-preserved Neolithic village in northern Europe. Nowhere else can you see the main pieces of furniture laid out for use, and the walls of a house surviving right up to the level of the roof supports.

The village was lived in by an early farming community for more than 600 years, from 3100BC until 2450BC. Its remarkable preservation has come about because of a number of related factors. Particularly important was the decision of the original builders to bury the walls of their houses up to roof level by surrounding them with a tough, clay-like soil formed by the decay of their own refuse.

Instead of being thrown away, their waste seems to have been carefully kept – rather as we now build compost heaps. Only in this case the purpose was to provide building material, not fertiliser. This tough cocoon around the houses protected them against the natural elements of decay.

Almost as important was the local flagstone, which could be broken from its beds to make rectangular building slabs that did not need to be dressed further. This was perfect building material, allowing the construction of high-quality, dry-stone houses.

And finally, the winds and the sea spray meant that there was little usable timber on Orkney, so the framework for large pieces of furniture, which elsewhere would have been made of timber, was here made of slabs of the same flagstone.

Every house in the village has the same basic layout. Each one has a large single room with a floor area equivalent to two-thirds that of a modern two-bedroom, semi-detached house. Entry is by a small, single doorway through the thickness of the wall, and you have to crouch down to get through it.

The door was not hinged but was a large slab, probably made of stone, held in place by a cross-bar. Once across the threshold, your view would be dominated by the fire of the central hearth – probably kept burning all the time – and the large dresser placed against the wall opposite the doorway. Here you would find the objects that showed the family's importance in the wider community.

On either side are box beds with pillars at the front to support a canopy tied back to the wall. Above each bed ►

■ Tools made of bone had many uses for the Neolithic people, from leatherwork to stripping blubber from whales.

Enigma of stone balls



Detachable mace heads or throwing weapons? Perhaps sophisticated mathematical models? The speculation is endless. But one thing is clear – these 5,000-year-old balls are an endless topic of fascination for visitors to the Museum of Scotland.

About the size of a tennis ball, and carved from a variety of rocks, these balls would have been prestige items. Most are decorated with six plain raised knobs, but others with three to five, or seven to 55 knobs are known, as are a few mega-knobbers with over 100.

All but a handful of these balls have been found in Scotland, and most come from around Aberdeenshire. But one was found in a Viking grave in Norway – a 4,000-year-old souvenir, no less!

Considering the skill and patience required to make them, these balls probably had symbolic meaning.

► is an open cupboard. Of course, we now see these beds as stone frameworks, but we have to imagine them made much warmer and more comfortable with animal skins and plants such as bracken. It is believed there would probably have been curtains hanging from the canopy to keep out the worst of the draughts and to provide some measure of privacy as night fell.

In the early houses the beds were set back into the walls, but in later versions they projected out into the room. This minor variation is, amazingly, the only change made to the layout of the houses in more than 600 years.

Set into the floor are a series of small tanks made of stone slabs, with clay at every joint to make them watertight. These were probably used to soak limpets for fish bait.

There are several low cells built into the thickness of the wall which provided much extra storage space. But in one corner there is a much larger cell with a drain running from it. These seem to be Scotland's earliest indoor toilets.

All the houses are clustered tightly together and you get from one to another by low passages which are like narrow underground lanes. As every house has the same layout, and are all rather similar in size, none can be considered as a leader's house.

The set-up gives the impression of a close community with shared attitudes and values – very little room for non-conformists. Yet choosing to live in a village rather than in individual farms scattered across the countryside is itself very unusual among early farming communities in Britain.

However, the community's beliefs were obviously not all-powerful. The presence of doors in every house which can only be opened from the inside suggests that there was an awareness of the importance of other, presumably family-based, structures.

Sometimes people preferred to feel part of a smaller, more intimate group rather than the whole village.

It was perhaps the maintenance of this balance between the needs of the community and the individual which enabled the group to exist so successfully for so

long. The available evidence suggests that the whole community took part in some way or another in the agricultural activities that were the mainstay of the food supply. Cattle – some very large – were more important and numerous than sheep.

Pigs were much less common, and it is not certain whether they were domesticated, or perhaps the result of hunting wild boar. Certainly, jewellery was made from pigs' tusks.

We know much less about the growing of crops. Barley was definitely grown in some quantity early in the settlement's life, but its cultivation may have been abandoned later on because the climate made the yields uncertain and small.

But we must not think of the people of Skara Brae living on a monotonous diet of stews varied by steaks, lamb chops and the occasional pork chop. The local environment provided much more than that.

Venison came from red deer, introduced into Orkney by human groups, for none would have swam the Pentland Firth. Sea birds and their eggs were collected on the local cliffs. Oysters and crabs, cockles and mussels, cod and saithe were among the many delicacies that came from the sea.

Remarkably, given the large number of fish bones found during the excavations, there was no fishing equipment discovered among the wide range of surviving objects.

All in all then, it seems that the inhabitants of Skara Brae regularly enjoyed eating many things which we would now think of as luxuries.

Providing sufficient food does not appear to have been particularly difficult for them. And the large quantities of bone jewellery, and puzzling stone balls carved from hard volcanic rock, suggest that they enjoyed a large measure of leisure.

They were, of course, exploiting an immensely rich environment, particularly the sea and the coast, before modern hunting and fishing technologies were introduced. Then the sea teemed with fish, many of a size that modern fishermen can only dream about.



Whales, dolphins and porpoises were also considerably more numerous than they are now, even though there are still regular strandings today. Even walrus were regularly seen and perhaps might even have been breeding on Orkney at the time.

Whalebone, rich in oil, may well have been an

important fuel source in the absence of peat and any wood other than that washed up as driftwood from volcanoes of Iceland. This natural abrasive was widely used in shaping bone tools and jewellery.

And from the erosion of the huge, unexploited forests of North America, large trunks of spruce, larch and Wymouth pine were regularly left as drift on the shore

For a community living entirely by what it could grow or collect within Orkney, the material brought by the sea was a continuing reminder of a wider world beyond the horizon.

It seems likely that their spiritual landscapes would have stretched far beyond Orkney. All early farming groups needed ways of communicating with, and influencing, the natural forces that could seriously affect their lives.

Communities like those at Skara Brae built and used large chamber tombs to bury at least some of their dead. These tombs, encased in big stone cairns, were used over and over again through several centuries.

Yet the burials in them do not suggest that everybody was buried in the community's tomb – two old ladies were discovered buried beneath one of the houses at Skara Brae.

Instead, the intention seems to have been to mix up the bodies, destroying their individuality but creating a group of ancestors who represented the community's past and its accumulated

rights and privileges.

Bones were also removed for use in rituals and ceremonies beyond the tomb. And, as beliefs changed, people from Skara Brae may well have helped to quarry and transport the stone needed for the large new circles at Brodgar and the Stones of Stenness.

Communities that once exchanged only the necessities of life came together to build the centres for their religious ceremonies. ●

■ Nowhere can you feel closer to our Neolithic past than at Skara Brae.

TIMELINE

3,400BC

Earliest evidence of wheeled vehicle in Europe – from a grave in Poland.

3,200BC

The Man in the Ice dies in a blizzard while crossing the Alps. It will be 5,000 years before his body is found – almost perfectly preserved.



3,100BC

Neolithic people start to create a stone village in Skara Brae.



2,900BC

The town that will grow into the city of Troy, in modern Turkey, is established.

2,550BC

Work starts on Great Pyramid of Cheops, in Egypt.

2,450BC

The settlement at Skara Brae begins to decline.



■ Every house had the same features, including the central hearth and sideboard seen here, suggesting every family had equal status.

important fuel source in the absence of peat and any wood other than that washed up as driftwood from North America.

Of course, a single stranded whale represented an enormous resource for communities like those at Skara Brae. Skin, meat and bone – all would be fully used.

However, whales were not the only good thing to come from the sea. Pumice was often washed up on Orcadian beaches from the eroding lava flows of the

Stones that stand the test of time

■ Brodgar, the ancient stone circle on Orkney. Its builders laboured over many generations to erect a monument that would last for eternity.

With simple tools and sophisticated minds, our ancestors raised monuments of enigmatic beauty



■ There are 13 stones in the central ring of Callanish, a massive monolith at the centre, and rows of stones that radiate outward.

Those circles of tall, standing stones which have been left to us by their builders are among the most evocative and enigmatic creations on our landscape. They declare themselves usually in wild and beautiful surroundings, their presence adding silent drama to the natural scene. To walk into these truly ancient monuments, to place a hand against the weathered rock, there is a thrill of contact with the people who erected them five millennia ago.

The great ceremonial centres built around 3,000 to 2,000 BC imply societies on the edge of becoming influential civilisations. Other later stone circles testify to small egalitarian farming communities. The fact is that many remain enigmas. How were they created?

Scottish stone circles were built of locally available stone, quarried from bedrock outcrops with natural cracks like the Orkney flagstones. Removal could easily have been accomplished with wooden wedges. Inserted dry, then soaked, they could split the toughest rocks.

A stone about 5 metre long by half-a-square metre in cross-section weighs around five metric tonnes. It would take up to 100 people to manoeuvre it without mechanical aids.

Recent experiments show far fewer people are required if they use ropes, rollers, levers and ramps of earth or timber. Technology aside, the Neolithic builders would still have needed the support of large communities. It is possible

standing stones were sometimes erected to honour the dead. In some societies the act of mobilising a community to set up a massive stone increases the prestige of the organiser. But creating a near circular stone or timber setting involves more complex ideas of enclosed space to the exclusion of people.

One of the problems of looking at stone circles today is that the evidence provided by the stones themselves is only a fragment. Some stone circles would have been part of wider Neolithic landscapes or contained timber elements. Some were wholly built of timber.

The earliest stone and timber circles in Scotland seem to have been constructed around 3,000 BC. A timber circle of 63 posts, enclosing a U shaped setting of truly massive timbers, was built at Machrie Moor on Arran. The 12 Stones of Stenness in Orkney were probably erected around the same time. They help explain the motivation of the builders and of the later builders of the great stone circles like Brodgar or Callanish.

The Stones of Stenness stand inside a massive earthwork and once surrounded further internal stone and timber settings. They are close to the Neolithic settlement at Barnhouse with its special 'double' house, its entrance turned roughly towards midwinter sunrise, and a large hall built on a clay platform.

Roughly square with rounded corners, it had a central hearth and a northern entrance passage lined with upright slabs. A nearby huge

chambered tomb, Maes Howe, with a passage pointing approximately towards midwinter sunset, is built on a similar clay platform.

Barnhouse, Stenness and Maes Howe are roughly of the same time and illustrate different aspects of a single set of beliefs. Judging by the orientations of the Maes Howe passage, and the entrance to the special house at Barnhouse, sunlight at dawn and dusk during the midwinter months seems to have played a part in their beliefs. The Stones of Stenness seem not to have any significant astronomical alignment.

The excavation of the early timber rings at Machrie Moor and their surroundings has shown that they were set in a prominent position in the midst of well-populated landscape. Two tall stone circles stand nearby, probably of a similar date, so perhaps the timber circles at Machrie were built for the living and the stone circles for the ancestors.

Stenness and Machrie suggest the earliest stone and timber circles were set up in well-populated landscapes at the heart of the community. They were part of complexes of monumental structures built by people interested in significant celestial events such as the midwinter sunrise or sunset, but who did not reflect these beliefs in the way they aligned the stone circles themselves.

Later stone circles, like Callanish and Clava, reflect a more direct connection to astronomical events and populated landscapes.

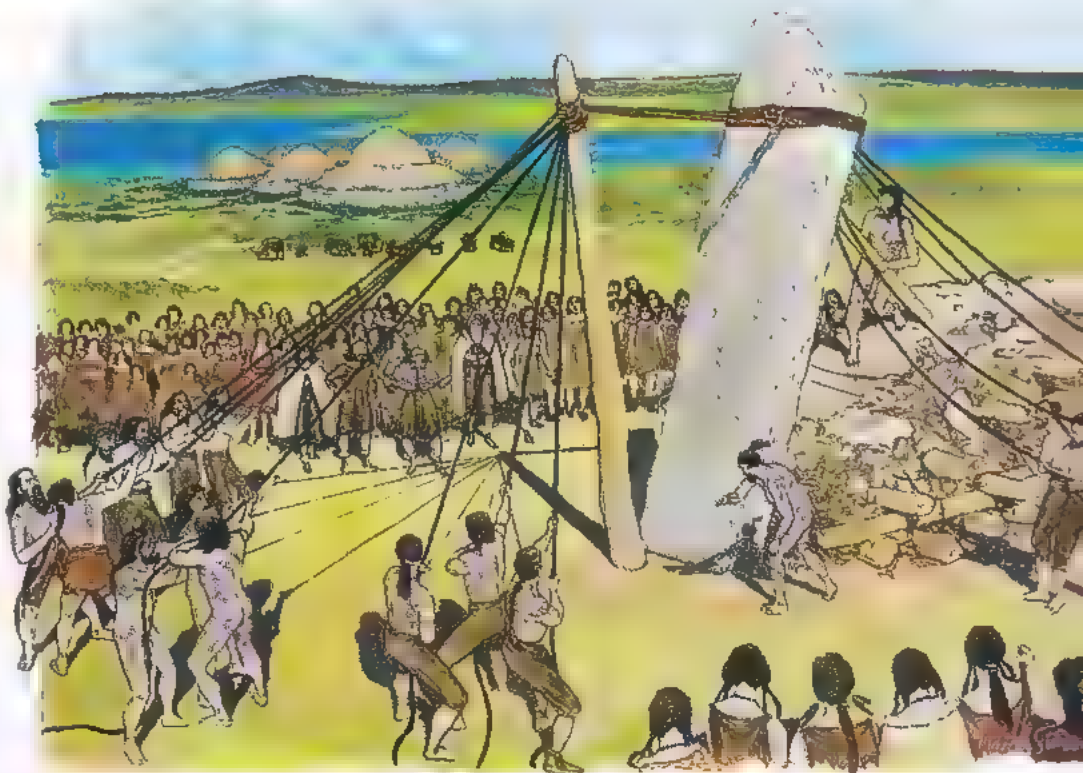
Callanish, on Lewis, is the most imposing of Scotland's stone rings. Set up between 2,900BC and 2,600BC, it surrounds a small chambered cairn and a massive stone monolith of slightly later date. The ring lies at the focus of stone rows pointing exactly south and roughly east and west, while an avenue of tall stones runs off to the NNE.

It has two fine stone circles in its immediate neighbourhood. A burial cairn lies exactly on the line of the avenue two kilometres to the NNE, and a third stone circle lies within sight across Loch Roag.

Little is known of the surroundings of Callanish as they are covered by peat, but recent excavations have revealed walls and structures. So it may have been part of a rich landscape with buildings for the living and for the ancestors.

Every 18.6 years, when the moon varies most in its daily rising and setting positions, it skims over the southern hills and, as viewed from the avenue, sets into the stone circle. Thus at Callanish, too, there seems to have been an interest in dramatic astronomical events.

At Balnauan of Clava, near Inverness, a tall stone circle surrounds two chambered burial cairns and a ring cairn that date between 2,000BC and 1,700BC. In the square kilometre around the monuments at Clava are at least six other similar sites with many more scattered around the Moray Firth. The passage of the



■ An artist's impression of how the great Stones of Stenness may have been raised using ropes, levers, rollers and ramps. In the background can be seen the Barnhouse settlement.

northerly chambered cairn at Clava is orientated towards the midwinter sun as it sinks behind a nearby hill above the southern cairn.

The thousand years that separate Callanish and the Clava cairns show that interest in astronomical events was alive and well, but were the communities who built them the same?

Aberdeenshire's stone circles perhaps show differing kinds of communities were involved. Similar to those around the Moray Firth, their tallest stone is in the south western arc of the rings and cremated remains of the dead were placed inside. But the Aberdeenshire rings, like Easter Aquhorthies, have a massive recumbent stone between the two tallest ring stones.

Because the stones are fairly evenly spaced, and the recumbent stones are so large that many people must have co-operated in moving and levelling them, it seems they were built by small, egalitarian groups of subsistence farmers. They, too, have an interest in astronomy, accentuating the drama of setting moon and sun.

The most recent research suggests some stone circles may connect to distant prominent hills. That work is at an early stage, but it is clear that they should be seen as part of ancient landscapes, abounding in small field systems and settlements, against a backdrop of the hills and mountains.

What the stone circles show is that the Neolithic peoples of Scotland were diverse communities and perhaps across time used their circles in differing ways. ●

■ The stone circles such as the formation at Callanish, below, linked their builders to sky, earth and landscape.



TIMELINE

3,000 BC

Prehistoric men start to erect standing stones at Callanish on the isle of Lewis.



3,000 BC

Hieroglyphic writing first used in Egypt.

2,350 BC

World's earliest-known law code is introduced in Mesopotamia.

2,100 BC

Work starts on the circle of bluestones at Stonehenge in Wiltshire.

1,700 BC

The last stone circles are built in Scotland.

Next TIMELINE
In Part II

Future king with a sweet golf swing

For those with a taste for the extraordinary in golfing history, the match between two Scots - a duke and a shoemaker - and two taunting English nobles, will give satisfaction. And not least because Scotland won.

Played over the old Leith Links in 1680, it was probably the first international game between the two countries. The young Scottish duke was, of course, the golf struck Duke of York, later to become James VII of Scotland and II of England, and most of Edinburgh turned out to see the match because money was at stake.

Like so many others at this time, the future king had been well smitten by the golf bug. The two English dukes teased him about his passion and an argument developed over whether golf had originated in Scotland or England. Eventually the challenge was thrown down to James, who immediately accepted and laid a wager on the result.

It was not the first or last time that a Scot, of royal blood or not, with a reputation or money to lose, has sought means to give himself an edge. And so James immediately sent out his runners to find the best golfer in Edinburgh. They returned with shoemaker John Patersone, who also made the leather golf balls used in those days.

The entire royal court turned up at the links, which was then one of Scotland's most famous golf courses, second only to St Andrews.

The affair had caught the imagination of the city and side bets were changing hands among the crowds. Scotland won and, although the score is not recorded, James generously handed over half the wager to his golfing partner.

John Patersone used the proceeds to build a house at Golfers Land in the Canongate on the Royal Mile, and it is there to this day.

It was back in the early 16th century that golf first cast its spell on the unsuspecting populace and the golf industry began.

Mary, Queen of Scots could hit a lengthy ball and



■ Lining up a putt. This foursome, in 18th century sporting togs, was playing over Leith Links.

the monarchs Charles I, Charles II, James IV, James VI and James VII (of the United Kingdom) all played over the historic Leith Links, the site of sieges and hangings.

Club-making became an important skill and by royal command in 1603, William Mayne, maker of bows, arrows and spears, also became golf club provider to the king. Golf balls were made of leather, stuffed with feathers in those days and in 1600 were priced at 'four schillings money of this realm'.

With the Scottish royal family resident at Holyrood, and with so many of them being golfing fanatics, it was not surprising that Scotland's capital became the fashionable seat of the game.

Courses began to be laid out around the edges of the old city with newly founded golfing societies. The Burghers or Burgess Golfing Society, founded in 1735 and now the Royal Burgess, claims to be Scotland's oldest properly constituted golf club.

Many early club members wore scarlet coats with their own individual facings and gilt

buttons. Most had their own champions or 'Cock o' the Green'. The dedication of one of them, the celebrated Alexander McKellar, of Bruntsfield Links, saw him practising short holes by lantern light. It is said he did a dance of delight after each good shot.

The artist Kay has captured McKellar addressing the ball for posterity in one of his Original Portraits.

Today's Ye Old Golf Tavern on the west side of Bruntsfield Links, established in the 15th century, was used as the clubhouse by a number of distinguished golfing societies playing over the course.

Another nearby 18th-century golfing tavern was Ran. Maggy Johnston's, which reputedly served a particularly potent ale. Poet Allan Ramsay dedicated a poem to her.

*When in our pouch we fand some clinks
And took a turn o're Bruntsfield-Links
After at Maggy's at Hy-jinks
We Guzzled scud
Till we could scarce see half our drinks
Cast off our duds*

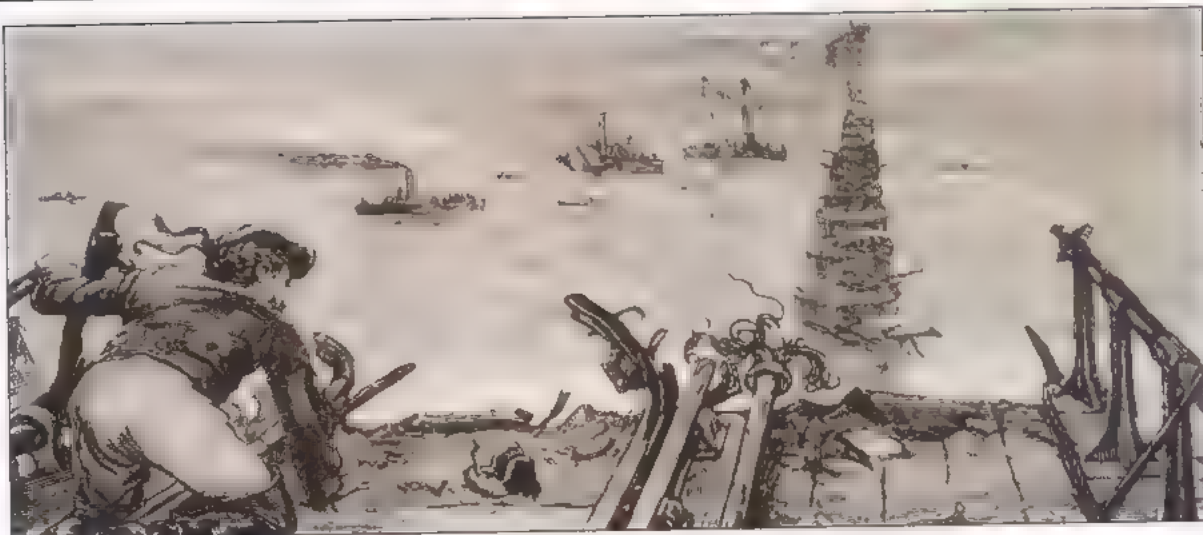


■ Alexander McKellar, Cock o' the Green at Bruntsfield, as pictured by artist Kay.

That figures...

432 new knights were created in July, 1603, as James VI united the crowns of Scotland and England.

47 times Jim Renwick played rugby for Scotland before his team won an away match - at Cardiff in March 1982.



75 perish as train plunges into Tay

Section of bridge collapses in fearsome hurricane

A catastrophe so appalling in its magnitude and suddenness and at first almost to baffle one's efforts to realise it, occurred last night in the fall of a portion of the Tay Bridge with, it is feared, a passenger train that had been in course of transit.

It was pretty late in the evening when the intelligence reached Edinburgh and up to an advanced hour only the most meagre information was obtainable. Scarce as it was, however, the news received only tended to confirm the fears entertained when the first vague information came to hand, that the fall of two or more girders of the bridge had caused a lamentable loss of life.

The 4.10 Sunday evening train from Dundee had reached Edinburgh all right at twenty minutes past seven or some ten minutes late. The 4.15 train from Edinburgh to Dundee left on time and it is this train which is believed to have been upon the bridge when two of its central girders yielded to the force of the gale.

Readers will remember that a notable feature of the bridge was the series of thirteen great central girders, varying in length from 227 to 245 feet, which spanned the navigable channel

First newspaper report of the disaster on 28 December, 1879 from *The Scotsman*

of the Tay

Two girders went to form each span, the line passing in between the great iron frameworks, at the height of 88 feet. Two girders, or one span, would appear to have given way. The train was due to cross the bridge between 7.8pm and 7.20pm.

The surmise is that, as it was in the act of crossing, a terrific gust had swept down the valley and that the resistance offered by the train had helped to intensify its destructive force, which consequently proved sufficient to propel the girders and the train into the river.

From what we can learn, this train on leaving Edinburgh consisted of six carriages. It is understood to have carried about 200 passengers. Of these a large number would no doubt leave as the train passed through Fife, so it is impossible to estimate the extent of the disaster so far as human life is concerned.

● The death toll was later confirmed as 75

The scene at Dundee

It was about half past seven o'clock when a rumour of the catastrophe spread through the town. As the report passed from mouth to mouth, it was thought incredible, and people reminded one another that the bridge, since its completion, had withstood many a terrific blast. The news was so appalling that, although it was generally received with reservation, everyone who heard it made off at once, with bated breath, to the Magdalen Yard Point or to the Tay Bridge Station.

In the course of a very short time, those in quest for information could be counted by hundreds. Inquirers proceeded by the Perth road and the Esplanade to the Magdalen Yard Point north signal cabin. There the railway officials, who had naturally become alarmed, especially as they became aware that there was no communication with the south end of the bridge, resolved to satisfy themselves

whether the structure was safe or not.

Accordingly Mr Roberts, Superintendent of the Locomotive Department, determined to go along the bridge. This he did at considerable risk for the force of the hurricane was still such that at times he was almost completely lifted off his feet and was in great danger of being blown into the river. Urged, however, by anxiety to learn the truth, he persevered in his penious task, and having walked along the bridge as far as he could, crawled on his hands and knees to the point where the high girders begin. Here his course was arrested.

Horror-stricken he found that the rumour in circulation was too true; the whole of the thirteen girders, each 245 feet in width and 250 tons in weight, and which, as it were, had formed a tunnel for the middle of the bridge were gone, and nothing remained but the bare iron piers which had supported them.

A selfless act of courage

Highland lass Flora MacDonald helped to smuggle the fugitive Bonnie Prince Charlie to Skye under the noses of government soldiers

*Speed, bonnie boat, like a bird on the wing
"Onward", the sailors cry:
Carry the lad that's born to be king
Over the sea to Skye*

Prince Charles Edward Stewart had been dressed as an Irish maid, Betty Burke, in a specially-made frock of white calico with a pattern of lilac sprigs. Once on Skye, he managed to cross the island and make his way to Raasay and eventually to France. Flora, of course, was swiftly arrested and taken by sea to Edinburgh and onwards to London, a political prisoner. And quite apart from the perilous situation she was in, the 24-year-old Flora's life had changed for ever. She had become a celebrity.

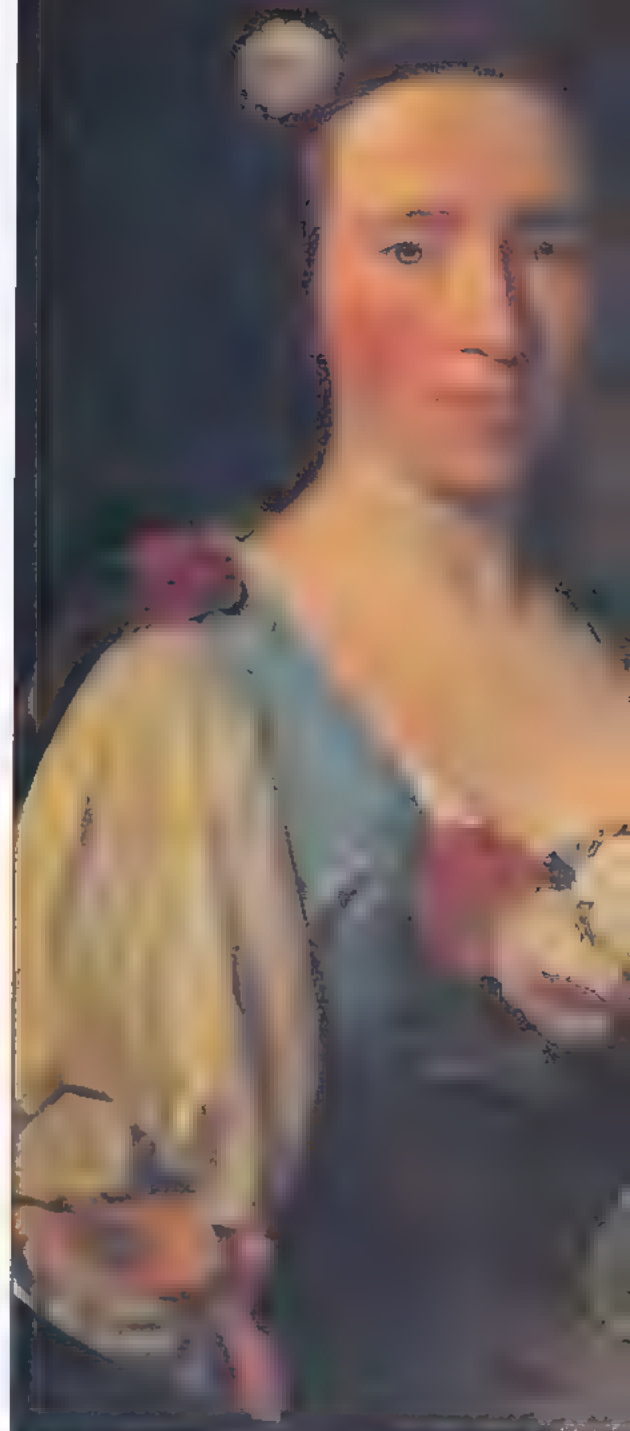
Even while she waited for two months aboard HMS Bridgewater in the Firth of Forth, she was the focus of much excitement among the Jacobites of Leith. 'Tea table Jacobites, they have been called. The indulgent ship's captain allowed Flora as many visitors as she wished, and the local women of society couldn't get enough of her. Sometimes, they danced together in her cabin, although Flora declined to join in.

Their visits became the stuff of drawing room chat and the visitors were also able to feed Flora's reminiscences to an Episcopalian priest, Rev Robert Forbes, who was busily collecting stories about the Jacobite uprisings.

In this circus-like atmosphere, with the possibility of a death sentence hanging over her, the young woman managed to maintain her dignity. Fame was something she could do without. Yet when she reached London, the seat of a government with a reputation for taking revenge, things would get even worse.

Other Scots implicated in Bonnie Prince Charlie's failed adventure were being put on trial and sentenced to death by decapitation. Their severed heads were being displayed in London, Carlisle and Manchester. Yet while Flora waited anxiously for her own fate, as the year turned to 1747, her celebrity even increased. Despite the death sentences, or maybe even because of them, Jacobite sympathies were being expressed again.

Then, incredibly, she was commanded to meet Frederick, the Prince of Wales. It's thought the prince did this just to annoy his father, George II. But the prince was so taken with Flora's open



■ Striking beauty and loyalty were Flora MacDonald's gifts.

manner that he made sure 'to procure her every comfort'.

Part of the reason for all this alarming fame was a spoof novelette called *Alexis, or The Young Adventurer*. Published anonymously, it was a thinly disguised account of Prince Charlie's campaign with the names changed. This witty piece was the talk of fashionable London.

Nearly a year after her capture, an amnesty was declared and Flora MacDonald was freed. Back on Skye, Flora was married in 1750 to Allan MacDonald of Kingsburgh, and they emigrated to America. When her husband was made prisoner during the War of Independence, Flora returned to the Hebrides to await his release. In 1790, she died in the bed at Kingsburgh which had been slept in by Bonnie Prince Charlie during his last night on Skye.

Thumbscrews were Bloody Tam's legacy

General Tam Dalyell of the Binns

Also known as Bloody Tam, General Dalyell, an ancestor of today's Labour MP, became notorious for his suppression of the Covenanters at the Battle of Rullion Green, in the Pentland Hills, in 1666. Little more than a thousand Protestant 'rebels' had marched from Dumfries towards Edinburgh, armed only with scythes, pitchforks and staves.

They wanted to enter the city to air their grievances about the religious persecution inspired by Charles II. But they were turned back and found their route home blocked by General Tam and his well-armed government troops.

About 50 Covenanters were killed before gathering darkness stopped the slaughter. Of the 80 men taken, 21 were later hanged while others were transported to America as slaves. Dalyell had supported the royalist cause since his youth.

When he learned of the execution of Charles I, he vowed not to cut his hair or his beard again until the monarchy was restored. But it was noted that when Charles II gained the throne, Dalyell still wore his hair long.

Among other exploits, Tam managed to escape from the Tower of London, where he had been imprisoned after Oliver Cromwell won the Battle of Worcester. He fled to Russia where he achieved high rank in the army of Tsar Mikhailovitch, until Charles II recalled him to Scotland to be commander-in-chief of his forces. With him, Tam brought back a useful Russian invention: the thumbscrews.

So another nickname was The Muscovite De'il.



■ General Tam was ruthless to his foes.

The bestseller doctor

A J Cronin

The creator of the much loved television character Dr Finlay was born in 1896 at Cardross, Dunbartonshire. Archibald Joseph Cronin studied medicine in Glasgow after spending his school years at Dumbarton Academy, but before he graduated he was called up to serve as a surgeon sub-lieutenant in the Royal Naval Reserve during the First World War.

Later, he became a good doctor by all accounts, working in a succession of hospitals. In 1921, he married fellow doctor Agnes Gibson before taking up an appointment as a medical inspector of mines in South Wales three years later.

At that time the mining communities faced great hardships and the experience was not lost on the young Cronin, who stored away in his



■ Cronin found fame as a doctor-writer.

mind many of the hardships, situations and emotions he encountered for future use. For like quite a few Scots medical men – Arthur Conan Doyle and James Bridie, for example – Cronin saw his future as a writer.

In 1926 he practised in London, but ill-health began to take its toll and he was forced to give up medicine in 1930. He went to convalesce in the West Highlands and seized the opportunity to pick up his pen to begin to write seriously. It was here Cronin completed his first novel, Hatter's Castle.

It was immediately successful, and Cronin became a full-time writer. Over the next 40 years a string of other novels followed, often based on his experiences as a doctor. Probably his most controversial novel was *The Citadel*, published in 1937 and attacking the practices of Harley Street physicians. This added fuel to the debate which led to the creation of the National Health Service.

Some of his other stories formed the basis of the TV series *Dr Finlay's Casebook*. As well as this, two of his novels were adapted for the screen – *The Keys of the Kingdom* and *The Green Years*. Cronin died in Switzerland in 1981, aged 85.



Grocer to the world

The boy from the Gorbals became a tycoon and friend of royalty. Yet, true to his roots, Thomas Lipton left his fortune to the poor

He was the Victorian Richard Branson – a brilliant and popular entrepreneur who publicised himself ruthlessly, delighted his customers, used balloons to promote himself, and had a passion for sailing.

Thomas Lipton rose up from spending his infant years in a tenement in Glasgow's notorious Gorbals to become one of the greatest grocers the world has ever known.

He built a retail empire which stretched across the world, became a friend of kings and queens, and even helped to smooth over relationships between the British and American governments.

Lipton was a marketing genius. He knew how to get people into his shops, and how to ensure they kept returning to spend their money. He was to turn his Lipton's shops into the world's first High Street retail chain.

He was born in Glasgow in 1850, the son of Irish parents living on the edge of poverty. His inner drive meant that at the age of 17 he saved up his odd job earnings as an errand boy in order to emigrate to America – the land of opportunity.

Once in the USA, he quickly learned about running a business. He spent time working in a New York grocery store, where he observed the importance of displaying goods properly and advertising them cleverly.

He returned to his native Scotland four years later and quickly opened his first shop in Glasgow's Stobcross Street. It was brutally hard work at first but the venture quickly became a success and he started to expand rapidly across Britain.

Lipton was a workaholic, and the

immense energy he threw into the business contributed greatly to its success. But his greatest skill was in spotting a marketing opportunity and knowing how to exploit it.

One of his first tricks was to buy giant cheeses – a great novelty at the time – to put in his shop windows to attract attention. In a typically flamboyant gesture, one year, he bought the largest cheese in the world and stuffed it with gold coins as a gimmick in the run-up to Christmas. When the cheese was cut on Christmas Eve, there were near riots as the public rushed to buy a piece. Needless to say, he sold every last crumb.



■ The world's first chain store.

His talent in attracting self-publicity was legendary, and he managed to sniff out even the most unlikely of opportunities. When a dangerous old chimney in the middle of the city was due to be demolished, he duly offered to make it safe – provided that he was allowed to paint the Lipton name on it.

Amazingly, he even succeeded in having the Lipton logo painted above the entrance to the Great Pyramid in Egypt.

Another trick which kept him in the public eye was producing his own

pound notes which could be spent in his shops – the forerunner of today's gift vouchers. However, Lipton was far more than a clever self-publicist, he was also a brilliant businessman.

He believed that the way to create a successful retail empire was to expand relentlessly. To achieve constant growth, he knew he had to do two things: ensure complete customer satisfaction, and secure his supply base. He was one of the first businessmen to offer money-back guarantees: if you didn't feel something was of the highest quality, then you could obtain a refund.

In order to ensure consistency of stock, Lipton didn't just do deals with his suppliers – he bought them over. He snapped up tea, coffee and cocoa plantations around the world as well as fruit farms, bakeries, jam factories and meat curing houses.

When it came to ensuring that his goods were of the highest quality, his attention to detail was ruthless. He bought butter and eggs from Ireland, paying an employee five shillings to intercept the local farmers on the way to market and grab the best produce off them before anyone else got a

look in

The business grew at a frenzied pace. By 1889, he had opened 150 stores, turning over £1 million a year – an absolute fortune in those days. Following the death of his parents he moved control of the business out of its vast headquarters in Glasgow's Hyde Park Street and down to London.

By 1896, he was presiding over an empire which had grown to 300 stores serving 300,000 customers every day. The company was opening a shop practically every week, and reached a high point of more than 600 stores



Lipton eventually turned the business from his own private concern into a public company, but it is a measure of his genius that he made £2 million from the sale yet managed to keep his job at the head of the firm

Despite being a workaholic, he did find time for one other pursuit yachting. Lipton had a succession of yachts, each called Shamrock, which he used to compete in the prestigious Americas Cup, racing five times between 1899 and 1930. He never won, but accepted defeat each time with good grace and generosity and became known as the world's best loser.

His generosity manifested itself in other ways, and helped to endear him to politicians and royalty. In 1897, the year of Queen Victoria's Diamond Jubilee, he helped to rescue the Princess of Wales from a major embarrassment when her fund to provide a commemorative dinner for the poor raised only £5,000 instead of the £30,000 needed.

Lipton anonymously handed over the missing £25,000. His role as benefactor was eventually leaked to the Press but he earned a knighthood from the episode, became a personal friend of the royals, and found himself propelled to the highest levels of British society.

Edward VII asked Lipton to help repair relations with America caused by the Boer War.

While on his travels he struck up a relationship with Rose Fitzgerald, who was later to become the mother of John F. Kennedy. There were rumours of an engagement, though one was never forthcoming.

Lipton's sexuality remains one of the most interesting and mysterious elements of his life. While in his teens, he appears to have made a young Glasgow millhand called Margaret McAuslan pregnant and then quickly married her. However, the child died and the marriage was quickly forgotten.

Lipton had a reputation as a ladies' man, and the Press continually speculated wrongly – that he was about to marry. There were suggestions that he was homosexual, and that he possibly had a relationship with William Love, who eventually ended up sharing his house in Cambuslang and became the company's general manager.

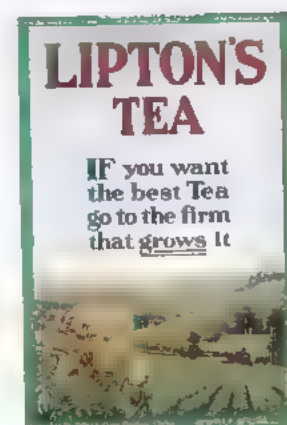
When his house partner moved to London, Love stayed in Glasgow, and Lipton engaged three Singhalese house boys at his palatial home in the capital. They were regarded as something of a novelty, and rumours started to spread.

Questions remaining over Lipton's private circumstances cannot overshadow the influence he had on Scottish and British life. He was one of the great entrepreneurs of Victorian Britain, and the role he played quietly in assisting the British government may never be fully known. Despite being a strict Presbyterian, he is thought to have acted as an intermediary in talks between Irish Republican leader and founding father of the Irish Free State, Michael Collins, and British politicians.

Lipton finally lost control of his empire in a boardroom coup in 1927, and it ended up in the hands of the business conglomerate Unilever. Yet the strength of the brand he created was such that the Lipton's name did not disappear from the High Street until the 1960s, when it was overwhelmed by the supermarkets. The famous Lipton's tea brand, though, exists to this day.

Lipton died aged 83 and was buried next to his beloved parents at the Southern Necropolis in Glasgow. Thousands turned out to watch his funeral procession. There was a genuine affection for him in his home town and he repaid in typically generous style, leaving his fortune for the city's poor and destitute.

■ Lipton enjoyed the dual role of philanthropist and publicist.





It's not only the Highlands and Islands which boast impressive stone memorials... Cairnpapple Hill in West Lothian is a site not to be missed.

In ancestral footsteps

Our intrepid biker historian David R Ross sets off on the trail of Jock Tamson's first bairns



I suppose few of us give a second thought to our earliest ancestors, the folk who first colonised 'Scotland' after the last Ice Age, but their blood runs in the veins of many modern Scots and remnants of their times dot our landscape.

Our forefathers used stone, always in plentiful supply, to build their memorials, their burial mounds and their cairns. Stone has always been a magical substance in Scotland – the legends surrounding the Stone of Destiny testify to that, and the early peoples went to great effort, dragging huge monoliths many miles, or stones in their thousands to high hilltops, to take their place in shaping our history.

When thinking of these stone memorials, we tend to immediately focus on the impressive Highlands and Islands examples, like Callanish stone circle on the island of Lewis, or Ring of Brodgar in Orkney. It is true the finest examples are in the less industrialised parts of Scotland. In fact, that is the very reason for their survival.

However, there are still some sites well worth a visit in the densely-populated Central Belt.

Cairnpapple Hill is not only an easily accessible example, lying just a few miles north of the M8, but it is also a fabulous viewpoint on a clear day. It stands near the village of Torphichen in West Lothian with views stretching as far as Arran to the west and to the Bass Rock in

the east. Its summit boasts a large burial cairn surrounded by earthworks and burial pits.

Many hills have remains of large cairns on their summits, which are comprised of thousands, if not millions, of stones that must have taken a phenomenal amount of man hours to gather and construct. Two fine examples are Tinto Hill near Lanark, and Cairn table above Maunkirk in Ayrshire.

One of the most accessible sites in central Scotland is Huly Hill, which stands beside Newbridge roundabout, where the M8 and M9 join. Standing 30 metres across and three metres high, it was once a large stone circle, but now only three of the stones remain. Motorists pass within feet of it daily without knowing it exists. Talking of

driving, nearly all Scotland's major through-routes follow the same lines our stone-age ancestors used, for the hilly topography of our country dictates few route choices between two points.

An examination of any Ordnance Survey map will reveal ancient sites scattered over the face of the land.

I cover the countryside on a regular basis and am always amazed at the standing stones I come across by accident. Carrying a map will reveal many others, some close to smaller roads where you can park and examine them.

The North East is particularly

rich in ancient stone remains. Many standing stones have been used for later purposes than those for which they were erected. Some have been carved with Christian symbols.

The Wallace Stone in the Orkney Islands is an ancient monolith, but it may have been used as a gathering site for part of the army before the Battle of Stirling Bridge, and so the name has stuck.

Two standing stones at Randolphfield police offices in Stirling were used by one of the Scots Divisions as a marker line at the Battle of Bannockburn. So we can see our medieval counterparts also used the stones erected by their ancestors as landmarks. Many

■ Stone has always been a magical substance in Scotland

of the islands off our shores have remains in a good state of preservation. Arran has several well-preserved stone circles.

There is much controversy surrounding the exact purpose of our standing stones and circles.

It would seem that many may have been used as calendars or special places where sky deities were worshipped and, later, sought after burial sites.

These ancient peoples also built circles from wood, which time has eroded, leaving only the stones standing as mute testament to their existence.

That figures...

38 MacDonalds were slain in Glencoe in 1692 by Campbell of Glenlyon's men on the orders of William of Orange.

39 people were killed in October, 1948, when a KLM jet hit an electricity cable near Tarbolton, Ayrshire.

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Illustration: Cover Standing stones of Callanish; Historic Scotland p4 Photograph: Eysteinn Tryggvason. p5 Globes: Scottish Natural Heritage. p6 Glasgow, Aberdeen, Edinburgh, Elgin: Still Moving Pictures, James Hutton by Sir Henry Raeburn. National Portrait Gallery/National Galleries of Scotland p7 Geology illustration, Helen Black; Ailsa Craig, Rum RCAHMS, Bass Rock Jamie Shepherd. p8 Dinosaurs courtesy of BBA. Walking With Dinosaurs series; Fern leaf, reptile sandstone footprints: NMS. p9 crinoid: NMS; Tree Fossil Glasgow Museum. p11 Photograph: Mike Williams p12 NHPA/B&C Alexander; illustration Helen Black p14 Globe illustration Helen Black; main illustration Harry Bland, photographs by Bill Finlayson and NMS

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BANK OF SCOTLAND

DOME OF KNOWLEDGE



Picture: QA photos/NM

**It's thrilling,
a place that
celebrates
our past and
looks ahead
to the future**

What's inside the Dome? The millennium's big question. We've all seen the Dome from the outside, on TV and in the papers. We know it's beside the Thames at Greenwich.

We know it's been built to mark the millennium.

And that's about it. Most of us haven't a clue what's inside. Is it a giant indoor theme park, with exciting rides and attractions?

Is it an exhibition, designed to show British life at the turn of the millennium?

Is it a sort of circus/pantomime, with live acts and entertainers?

Actually, it's none of these things. And all of them.

The Dome is unique. It's an experience. This is a place, split into 14 zones, that will make you laugh and make you think.

It's eye-opening and mind-boggling. It celebrates our past and looks to our future.

You'll be amazed, thrilled and inspired. And after six hours or so (the Dome is huge) you'll be very tired.

But what's the point of it all? Why has the Dome been built?

For one year only, the Dome is the focus of Britain's millennium celebrations. It will close its doors on December 31, 2000.

When you think that only 1 in 40 generations actually live to experience the turn of a millennium, you'll accept that it's quite a special time.

Having said that, the idea behind the Dome is that the millennium is more than a point in time. It's a point of view.

An attitude. It's an opportunity to look back on what's been achieved in the past and to look forward to how we can improve things in the future.

It's a chance to look at who we are, what we do and where we live.

Each of the zones in the Dome look at a particular aspect of our lives and our world.

Each will provide a different experience. In total they add up to the Millennium Experience - a place that brings you a dancing, flying, storming love story.

As big as Trafalgar Square, as loud as a rock concert, the Millennium Show is a high-rise, high-energy spectacular.

Part circus, part carnival, all action, it's a love story set amid a series of cataclysmic, epoch-making events.

The show will take over the central space of the Dome up to five times a day, so every visitor will get a chance to see it.

And hear it. The powerful soundtrack has been written by international rock star Peter Gabriel. He has collaborated with rock architect Mark Fisher to create a live show that will be the climax of your visit to the Dome.

Mark has designed mega-concerts for The Rolling Stones, Pink Floyd, U2 and Tina Turner, so he knows how to make an impact.

Among the stars of the show are acrobats, dancers, bungee-jumpers, aerialists, jellyfish and dragonflies. Alongside them, in supporting roles, are trapeze artists, stilt-walkers, trampolinists, insects, dancing plants and hideous mechanical monsters.

Get the picture? Basically, the Millennium Show is an event unlike any other you've ever seen.

And the whole pulsating performance is included in the price of your ticket to the Dome.



A step inside the millennium's most exciting day out



Picture: QA photos/NMEC

No matter how young or old you are there's so much in the Dome for you

Uhe Dome. What's in it for you? Who'll get most out of a day at the Dome? The answer is "You will". However young or old you are, there's something in it for you.

What's in it for kids?

Plenty. The Dome is not some dry and dusty exhibition with 'Don't touch' signs everywhere. It's a non-stop indoor 'do touch' theme park.

In the Play zone, kids can have a go at an amazing collection of new games. They can put together a jigsaw of their own moving face, compose their own music and teach monkeys to dance during a virtual jungle trip.

On a voyage through space they can have close encounters with Gaia and Max, two alien pilots created by Jim Henson's Creature Shop.

In the Talk zone, they can meet up with ET and get to grips with the communication age.

They can find out what happens when they eat too many chips and sweets, as they walk through a giant human body in the Body zone. And they can help Cogsley and Sprinx, the Timekeepers of the Millennium, as they search for the jewels that power Earth's Time Clock. Best of all, they can go to a school where the lessons are given by trees.

What's in it for Grandad and Grandma?

Grandparents will have a great time at the Dome.

They can call in at Self Portrait and see what it means to be British. Our attitudes. Our tastes. Our style. They can go back to school in the Learning zone, with the old sounds and smells wafting down an old school corridor.

Then there's the Rest zone, a space to escape the hectic pace — for old and young.

What's in it for teens?

They can join in one of the world's biggest table football games, as they test their skills in the Work zone. Then, if they feel like a change, they can be Asian, Chinese and West Indian, all in ten minutes. The Mind zone has special 'morphing-booths', where people can change their race and sex.

In the Body zone, blondes can go ginger, or go bald. In Home Planet they can take a virtual voyage, where they'll be buffeted by high winds, feel the temperature drop to near freezing, experience the searing heat of fire and discover all-enveloping quiet.

What a place! Michael Jackson's already been to have a look around and James Bond has been crawling over the roof in the new film *The World Is Not Enough*.

What's in it for mums and dads?

First stop for mum may well be the Money zone, where she can have a look at one of the biggest diamonds in the world, the 203-carat Millennium Star.

Maybe dad will take the hint, as he gets the chance to blow a million quid in a mad spending frenzy.

While dad puts years on his age at the Body zone, mum can put her feet up at Our Town Stage, where she can see local communities telling their story of their town or city. They can meet up in Home Planet, and see a new film by Hugh Hudson, director of *Chariots of Fire*.

SO WHAT'S WHAT?

Body, sponsored by Boots supported by L'Oreal and Roche. Through the elbow. Up the escalator in the arm. A journey through the human body. Explore the advances in science and medicine. Could you live to be 140?

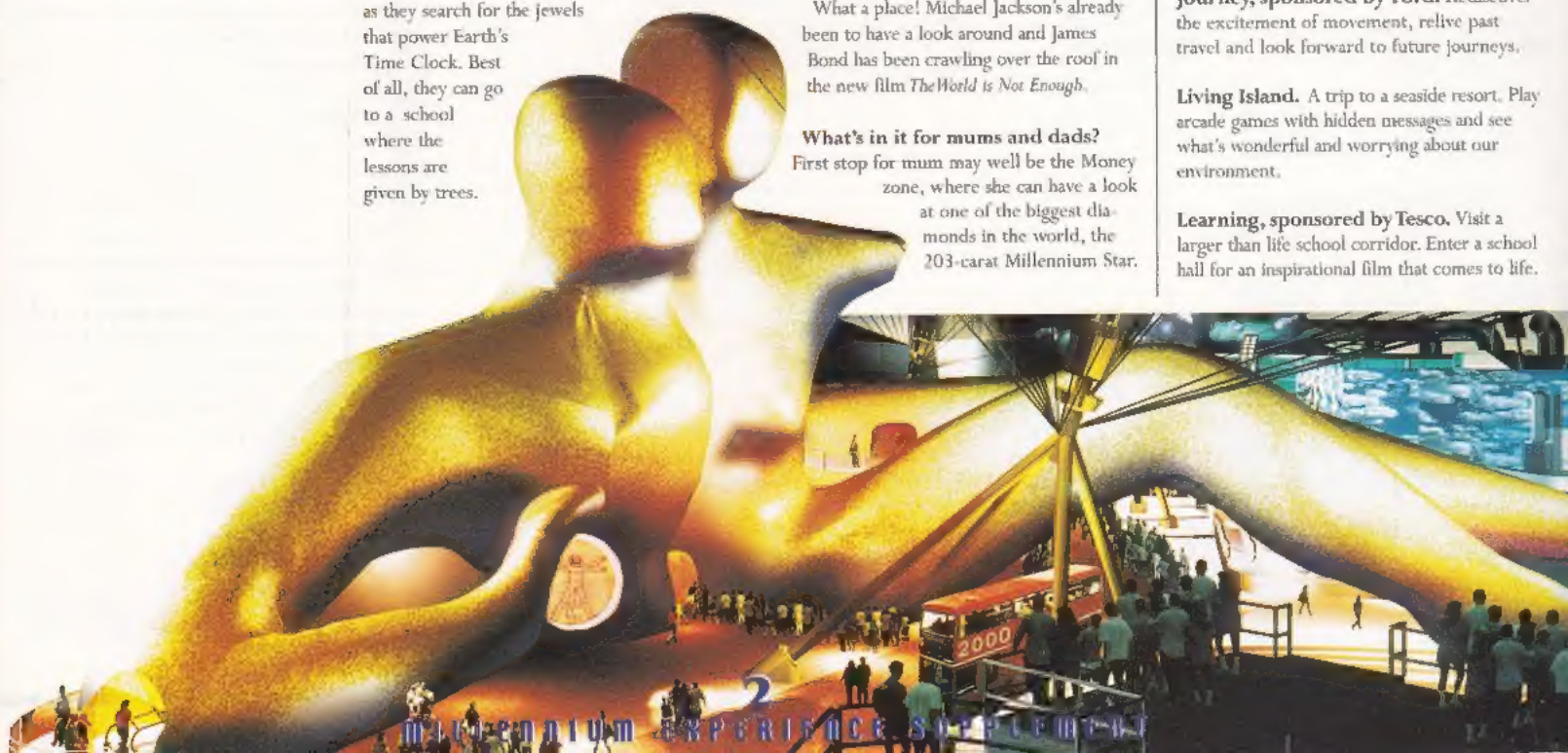
Home Planet, sponsored by British Airways and BAA. Take an amazing journey: departing and arriving at the most incredible planet in the universe — Earth.

Self Portrait, sponsored by Marks & Spencer. A celebration of our country, people, attitudes and tastes.

Journey, sponsored by Ford. Rediscover the excitement of movement, relive past travel and look forward to future journeys.

Living Island. A trip to a seaside resort. Play arcade games with hidden messages and see what's wonderful and worrying about our environment.

Learning, sponsored by Tesco. Visit a larger than life school corridor. Enter a school hall for an inspirational film that comes to life.





See the 21st Century Domesday book.

Mind, sponsored by British Aerospace and Marconi. Experience the zone's gravity-defying architecture. Play mind games with robots. Change your race and sex.

Play. Save the cats from the dogs. Loop the loop on a bike. Play your own concerto. Venture into an electronic playground.

Shared Ground, sponsored by Camelot Group plc. Behind closed doors, we stamp our personalities on our spaces. In public we're more reserved. Experience what we could do with our communities and neighbourhoods if we really joined together.

Faith, Donations from the Laing Family Trusts, the Hinduja Foundations and other trusts and foundations. Explore the huge range of beliefs and religions that are part of the UK.

Talk, sponsored by BT. Take an exciting look at the potential of communication. Try new ways to 'talk' using technology. Become your own 3D computer game hero.

Rest. A mental flotation tank, where you can escape the hectic pace of modern life and the flurry of the Dome.

Money, sponsored by The City of London and a consortium of City interests. Blow a million pounds in a wild spending spree. Find out what the City does with your money.

Work, sponsored by Manpower. Experience the excitement of work in the future. Learn how to use your skills for the new world of work. Series of interactive challenges such as table football.

Our Town Stage, sponsored by McDonald's. The venue for over 200 performances from local communities.

HOW TO GET TO THE DOME

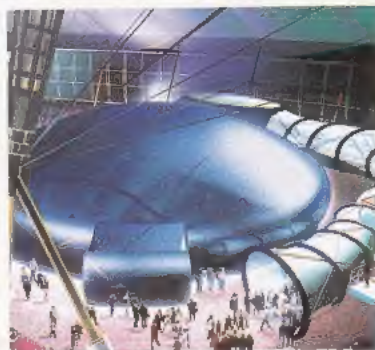
PUBLIC TRANSPORT This is the best way, as the area within two miles of the Dome is a No Car Zone. Rail and coach companies have special fares. For travel information visit www.dome2000.co.uk

For travel information about getting to the Dome from London, see London Transport's 'How to get to the Dome' leaflet, available from tube stations.

BY TUBE Take the Jubilee Line to North Greenwich for the Dome. It's less than 15 minutes from Waterloo. All tube lines connect with the Jubilee Line. The Docklands Light Railway (DLR) also links to the Jubilee Line, to the shuttle service of boats from Greenwich Pier and to bus routes. Dome ticket holders can buy a one day Millennium LT Card. It costs £3.50 for adults and £1.00 for children and it is valid for unlimited travel on the tube, buses and DLR at any time of the day of your Dome visit. You can buy a Millennium LT Card by calling the Dome Ticket Line on 0870 606 2000. Alternatively you can buy it from any tube station up to 4 days before your Dome visit where you must show a valid Dome admission ticket. Family and other Travelcards and normal single and return tube tickets are available at all tube stations. For London Travel information ring 0171 222 1234 (020 7222 1234) or visit www.londontransport.co.uk

BY BUS These routes run to the Dome:
M1 'Millennium Transit' from Charlton Station;
M2 'Millennium Transit' from Greenwich Station;
108 Stratford - Dome - Lewisham;
161 Chislehurst - Eltham - Dome;
188 Russell Square - Elephant & Castle - Surrey Quays - Dome;
422 Bexleyheath - Plumstead - Dome
472 Thamesmead - Woolwich - Dome
For further information ring London Travel Information on 0171 222 1234 (020 7222 1234)

BY TRAIN Mainline rail services link London with most major towns and cities throughout Britain. In the South East there is a network of frequent local trains. The tube links the Dome with mainline stations. At Charlton Station, the M1 'Millennium Transit' bus meets trains from Victoria and other mainline stations and North Kent. For info and bookings, ring 0845 7 48 49 50 or visit www.rail.co.uk.



BY AIR Heathrow, Gatwick, Stansted and City airports have public transport to the Dome.

BY BOAT City Cruises run boats from Waterloo and Blackfriars piers direct to the Dome every 30 minutes. Ring 0171 740 0400 (020 7740 0400) or visit www.citycruises.com for information and how to book tickets. White Horse Fast Ferries run boats from Greenwich Pier to the Dome about every 15 minutes. Ring 0870 240 3240 for details or visit the website www.whitehorse.co.uk/dome

BY COACH National Express run daily scheduled services from towns and cities around Britain to Victoria Coach Station. For information, including travel and entry packages, visit your local National Express ticket agent, ring 08705 80 80 80 or visit www.nationexpress.co.uk. From the coach station walk to nearby Victoria Station to catch a tube or train. Your local coach company may also run services to Victoria or direct to the Dome.

BY BIKE/FOOT A 1½ m riverside cycle/walkway links Greenwich town centre to the Dome, where there's a bike park.

BY ROAD There are Dome 'park and ride' car parks around London. Ring 0870 241 0541 to book a space and for directions, costs and details of onward travel to the Dome. Only taxis and minicabs can drop off and pick up at the Dome. Parking is available for motorbikes, pre-booked coaches and minibuses. The only car parking is for Orange Badge holders who should ring 0870 241 0540 to book a space.

Please remember that the area within two miles of the Dome is a No Car Zone.

Children's Promise – the millennium final hour appeal

Children's Promise is a once in a lifetime opportunity for us all to help create a better future for children.

It's a simple idea. Everyone in Britain is being asked to donate the value of their final hour's earnings of this millennium so it can be used to help children of the next millennium.

Marks & Spencer are covering the operating costs of the appeal to ensure that every penny received by Children's Promise goes towards children's causes.

For the first time, the UK's seven major charities have come together to ensure that Children's Promise reaches those children who are most in need.

Barnardo's promises to provide 100 extra services for children, including behavioural educational programmes, after-school schemes and curriculum development.

BBC Children in Need promises to help even more children in need through smaller children's charities and volunteer organisations.

Childline promises to set up five extra counselling centres, each professionally staffed to provide counselling to 50% more children.

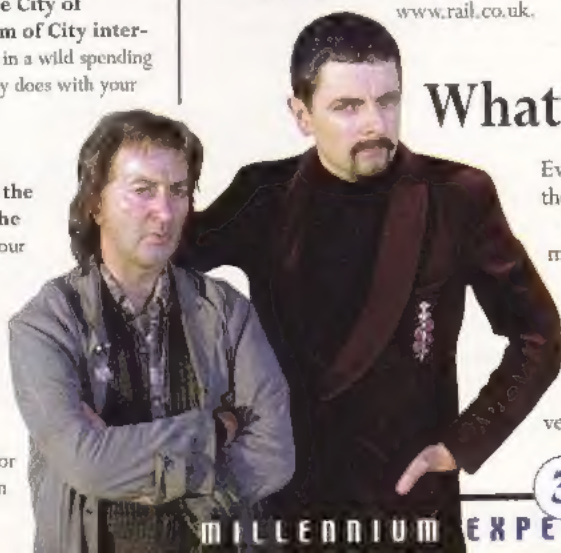
The Children's Society promises to set up four new refuges and five new outreach and prevention projects, helping 5,000 child runaways at risk on the streets.

Comic Relief promises to create a new international grants programme to help vulnerable and disadvantaged children in some of the world's poorest countries.

NCH Action for Children promises to open new family centres – an extra 50 centres would help a further 10,000 children.

NSPCC promises to provide five new treatment teams operating seven days a week, offering a treatment support service to abused children.

If you haven't already pledged the value of your millennium final hour's earnings, now's the time to do so.



What's in it for absolutely everyone?

Everyone loves *Blackadder*. With his untrustworthy sidekick, Baldrick, he'll also be at the Dome. Actually, he'll be just outside it, in Skyscape, London's newest venue.

On the big screen, *Blackadder* and the gang will feature in a time-travelling jaunt, meeting characters from the last 1000 years and beyond.

Written by Richard Curtis (*Four Weddings & A Funeral*, *Notting Hill*) this one-off *Blackadder* is rumoured to include many star guests.

And for the first time ever, *Blackadder* comes face to face with a dinosaur. Sounds like a laugh.

And Skyscape, sponsored by Sky Television becomes London's most exciting live venue at night with concerts, shows and other one-off specials.



SCOTLAND'S Millennium Festival goes from Unst to the Borders. This is a selection of what's happening where:

ONE O'CLOCK GUN MILLENNIUM EXHIBITION (EDINBURGH)

A TRAIL FROM PAST TO FUTURE SCOTLAND'S ANCIENT WOODLANDS (PERTH & KINROSS)

CENTURY OF CHILDHOOD (BORDERS)

GORDON 2000 A HOME-COMING TO HUNTLY

MILLENNIUM FESTIVAL OF FLIGHT (EAST LoTHIAN)

LINN GU LINN GAELIC FESTIVAL (DUNOON)

STIRLING'S MAYDAY MILLENNIUM CELEBRATIONS

SOUTH RHINS MILLENNIUM YEAR - A PHOTOGRAPHIC RECORD (STRANRAER)

The Scottish Millennium Festival - get involved, Contact NMEC's office in Scotland, TEL: 01259 219905 or E-MAIL: nmeec.scotland@newmail.co.uk

ONCE IN A LIFETIME

The first weekend of a new year is always rather special. The first weekend of a new century is a once-in-a-lifetime experience. So how special is the first weekend of a new millennium? It's special enough to mark with an explosion of celebrations that will be remembered well into the next millennium.

The weekend will be crammed with live performances, pageants, carnivals, light and water spectaculars and processions providing a high-flying start to the year-long Millennium Festival.

The Millennium Commission is supporting major city celebrations in Birmingham, Bristol, Coventry, Leeds, London, Liverpool, Manchester, Newcastle, Norwich, Nottingham, Plymouth, Salford Quays (with Tameside, Trafford and Manchester) Sheffield, Aberdeen, Dundee, Edinburgh, Glasgow, Inverness, Cardiff, Swansea, Belfast and Londonderry.

Hundreds of other towns, cities and local communities are being awarded smaller funds for their own First Weekend projects.

A programme has also been launched to help 2,500 local communities arrange Millennium Beacons across the UK, marking the start of local celebrations with a special beacon lighting ceremony.

All over the nation plans are building for events, projects, schemes - local and national - to celebrate the arrival of the

Millennium Festival

The Millennium Festival offers everyone in Britain a chance to be involved in the millennium celebrations.

It's a £100 million programme of grass-roots projects and events to celebrate the millennium in a way that will leave a lasting legacy. All the projects are being developed by local people to help and improve their communities.

The funding has been made available through the joint commitment of the Millennium Commission, the Arts and Sports Councils lottery funds of England, Scotland, Northern Ireland and Wales, the UK-wide Heritage Lottery Fund and the National Lottery Charities Board, acting in partnership with the New Millennium Experience Company (NMEC) which is also planning and organising the Millennium Experience.

As part of the sporting celebrations for the Millennium Festival the English Sports Council, in partnership with British Airports Authority (BAA), is funding the Millennium Youth Games. Area games will take place across the UK in 1999 and the year 2000, leading to a televised final. Eight sports will be represented: Tennis, Rugby, Girls' Football, Basketball, Netball, Athletics, Hockey and Swimming. Young people with disabilities will be encouraged to take part in the games, which will be the largest ever UK-wide sporting event for young people.

new millennium, the Scottish Millennium Festival.

From the Shetland Islands to Stranraer there's something happening throughout the 366 days of the Year 2000 which separate two Hogmanay celebrations that promise to be the biggest Scotland has ever seen.

There are some UK programmes in which Scotland will have a big part, such as BAA Millennium Youth Games, Youth FM and Millennium Beacons.

Then there's the Year of the Artist programme which will have a distinctly Scottish flavour.

With major support from the Scottish Arts Council, it puts in place 100 artists' residences all over Scotland as well as many superb creative leadership opportunities. The Lottery distributors in Scotland have supported 140 larger projects through the Scottish Millennium Festival Fund and are still assisting literally hundreds of smaller groups with grants of up to £5,000.

Telephone Awards for All - celebrating the Scottish Millennium Festival - ask for details on 0645 700 777.

As you would expect, Scotland's Hogmanay celebrations to welcome in the

new millennium will be enormous - both in little villages and large cities.

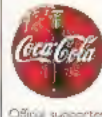
The Millennium Commission has given additional funds of almost £700,000 to support the celebrations, not just in Edinburgh and Glasgow but also in Dundee, Aberdeen, Inverness and Dumfries.

As well as the massive Hogmanay celebrations to start the year off with a bang Scotland will see some brilliant events and projects take place during the whole of 2000.

Sport will also be well represented during Scotland's millennium with sportscotland Lottery support for: the first ever Youth Commonwealth Games in Edinburgh; European Senior Badminton Championships in Glasgow; The Millennium World Highland Gathering and Games in Tain; The World Blind Golf Championships in West Dunbartonshire.

Also don't miss Threads in Tartan - a festival based in Glasgow reflecting the whole of Scottish society, highlighting the positive contributions of Scotland's ethnic

minority communities to developing cultural identity. People in Scotland are marking the millennium in hundreds of different ways - having fun and leaving a legacy.



Made possible by the National Lottery